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TITLE SEARCH AND RESCUE PERFORMANCE INDICATORS OPTIONS FOR CONSIDERATION

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DIRECTORATE OPERATIONAL RESEARCH (CORPORATE, AIR & MARITIME)

AORT RESEARCH NOTE RN-9603

**SEARCH AND RESCUE PERFORMANCE INDICATORS
OPTIONS FOR CONSIDERATION (U)**

by

G.L. CHRISTOPHER

NOVEMBER 1996

OTTAWA, CANADA



National
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DEPARTMENT OF NATIONAL DEFENCE

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OTTAWA, CANADA

NOVEMBER 1996

ABSTRACT

This report records the content of a presentation on options for Search and Rescue performance indicators that could be utilized by the Department of National Defence. The work was conducted as component of a research project to evaluate the SAR data collection system and its capability to support SAR performance assessment. Delays in the project have created the potential for the loss of this information. This report was prepared to preserve this material in an easily accessible form.

SEARCH AND RESCUE PERFORMANCE INDICATORS
OPTIONS FOR CONSIDERATION

BACKGROUND

1. In 1993, the Air Operation Research Team, then known as the Directorate of Air Operational Research (DAOR), undertook a study to identify performance indicators for Search and Rescue. This study was to identify indicators that could be utilized by the Department of National Defence (DND) to present to the Government and the general public DND performance in executing its SAR mandate. The performance indicators were also to be useful to DND to evaluate its SAR performance, identify developing trends, and take action where and when required.
2. Any performance indicators proposed, had to be viable in the sense that any data required to define the indicator had to be available or easily collected by DND. Many possible performance indicators could not meet this criterion.
3. DAOR identified many possible performance indicators that could be of interest and use to several levels of DND SAR managers. These indicators were primarily developed from data collected and stored in the SAR database SARIS, and from SAR evaluation models developed in DAOR. These options for SAR performance indicators were presented to DND SAR managers in a briefing in 1993. The contents of the briefing were not formally documented beyond the briefing notes provided at the presentation.
4. In 1993 DND was in the midst of switching to a new SAR data collection and archival system. It was intended that the work on SAR performance indicators would continue with the development of the new SAR database. At the time of this writing the transfer to the new SAR database system is not yet complete. The air operational research group has a standing project to evaluate the new SAR database system when the system is completed and access available.

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5. A component of the SAR database evaluation will be an assessment of the capability of the database system to support DND SAR performance appraisal. The SAR performance indicator options identified in the 1993 briefing are proposed as the basis for this component of the database evaluation.

6. With the impending transfer of personnel, the delay in the completion of the SAR database system, and the delay in the initiation of the database evaluation, there is a risk of possible loss information and continuity in this project. For these reasons, the content of the 1993 briefing on SAR performance indicator options has been formally recorded in this report. What follows is the text and slides used in the aforementioned briefing.

SLIDE ONE

7. The following text represents a few brief notes to explain the contents of the attached slides. This package is intended to provide a concise description of DAOR's proposal for DND SAR performance indicators and will serve as a basis to promote thought and comment.

SLIDE TWO

8. DAOR undertook this activity in response to a study request from the former National Defence Headquarters (NDHQ) Directorate of Air Operations and Training (DAOT). The study essentially requested DAOR to identify Search and Rescue performance indicators that could be used to inform the general public of the level of service provided by DND and could be used by the Department to quantify and evaluate the level of service provided by the Department to Search and Rescue. Presumably these performance indicators would/should also be utilized to monitor performance levels and identify when changes were occurring in the system.

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SLIDE THREE

9. The overriding criteria used by DAOR to judge the appropriateness of possible indicators was that the performance indicators should be evaluating the effect of factors over which DND has some control.

SLIDE FOUR

10. It is DAOR's contention that the SAR performance indicators should fulfil several functions. The indicators should quantify the current level of DND SAR performance. They should permit comparison with past levels of service to allow the determination of the existence of trends and changes that may be occurring in the overall SAR system, be it the rescue system or the nature of the SAR incidents. Also, the performance indicators should be useful towards the adoption of SAR standards of performance, should the identification of performance standards be desired. Finally, the performance indicators should support and promote planning and decision-making for DND SAR operations and system development.

SLIDE FIVE

11. The performance indicators proposed by DAOR can be divided into two classifications: Reaction Capability and Response Capability. Furthermore, the Reaction Capability indicators can be divided into basic measures and composite (system) measures, while the Response Capability indicators can be grouped under coverage, relative response capability (comparison with past SAR incidents), and intensity (magnitude of demands on the DND SAR system). The performance indicators were chosen from the perspective that data to derive the indicators must be readily available.

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SLIDE SIX

12. The SAR incident time line as identified by the Cross Commission Report was used as the basis for the formulation of the reaction capability performance indicators. The incident time line divides the total SAR incident into a series of actions that occur. At the beginning, the incident occurs (i.e., a plane crashes). This is followed some responsible agency being alerted to the possibility of an incident. Eventually, a Rescue Coordination Centre is notified. There it is decided if the incident is valid and warrants the launch of a resource. If so, a resource is tasked, launched, transits to the site, searches and hopefully locates the object of the incident. Once the object is located, personnel and equipment are deployed to provide assistance.

SLIDE SEVEN

13. As DND responsibility for a SAR incident usually begins with the notification of the Rescue Coordination Centre (RCC), this was used as the starting point for the specification of reaction capability indicators. The "basic measures" were formulated to isolate performance levels in each of the main actions that follow RCC notification until the onset of assistance being provided. These indicators include:

- | | |
|-------------------|---|
| Mobilization Time | - the time from RCC notification until the first DND resource launches to proceed to the incident site; |
| Transit Time | - the time from the launch of the first resource to its arrival on-scene; |
| Search Time | - the time from the arrival of the first resource on-scene until the SAR object is located; and, |
| Deploy Time | - the time interval between the location of the SAR object to the start of assistance being provided. |

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SLIDE EIGHT

14. The "composite measures" capture the accumulation effect of several of the basic actions taking place in the resolution of the SAR incident. These include:

- System Action Time - the time from RCC notification until the first resource arrives on-scene;
- System Location Time - the time from RCC notification to the SAR object being located; and,
- System Response Time - the time from RCC notification to the start of assistance being provided.

SLIDE NINE

15. The Response Capability coverage indicators would consist of a map showing the total area of Canadian SAR responsibility with an overlay(s) displaying the total area that can be reached by DND resources considering platform limitations, flight regulations, and refuelling location availability. A second coverage indicator would consist of a map showing time contours indicating the ideal transit time to arrive at the contour locations considering the same factors as for the coverage map.

16. For Relative Response Capability, ideal transit and transport effectiveness were chosen. These indicators will be derived from past incident occurrences. Specifically, the proportion of SAR incidents that are within resource rescue range from the nearest refuelling location and the proportion of incidents where all the lives at risk could be transported in a single sortie will be determined.

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SLIDE 10

17. The final class of proposed Response Capability indicators is Intensity that represents the magnitude of the demands placed upon the DND SAR system. Three performance indicators for this class are proposed:

RCC Case Load - the total number of SAR incidents that the RCC dealt with during the course of the year;

Resource Demand - the number of SAR incidents during the year which involved DND primary SAR resources; and,

Lives at Risk - the total number of lives that were at risk in the SAR incidents where DND primary SAR resources were involved.

SLIDE 11

18. The reaction capability performance indicators were chosen because reaction time is critical while saving lives. As such, reaction time should be a factor utilized in indicators employed to identify the performance of the SAR system. As well, reaction time has been used prominently in past evaluations of the National and DND SAR programmes and one can expect this factor to be used in any future evaluations. Any performance monitoring system that did not utilize reaction time in some capacity, is likely to come under severe criticism.

19. Coverage and the other response capability indicators are important for the identification and elimination of gaps and weak areas in the rescue system and the demands placed upon it.

20. Finally, the performance indicators proposed should be able to promote the early identification of changes which may be taking place in the system. The determination of the

- 7 -

specific factors which are causing the changes will probably require separate detailed and directed studies, but it will be the performance indicators that will highlight the requirement for these studies. The performance indicators should point out the need for assessments and decisions to address changes occurring in the SAR system.

SLIDES 12, 13, & 14

21. The strength of performance indicators is directly related to the number of factors whose impact on system effectiveness is directly or indirectly observable through monitoring the performance indicators. These slides list the plethora of factors that have a significant impact on the effectiveness of DND to carry out its SAR mandate. The composite effect of the factors and the effect of changes in the factors should be observable through regular examination of the proposed performance indicators. Monitoring the proposed performance indicators should foster the early discovery of changes occurring and allow reaction in a timely fashion.

SLIDES 15, 16, & 17

22. The following slides represent examples of what is intended for the SAR performance indicators and what form they could take. Although some slides are derived from current SAR data, they are intended as examples only, and should not be interpreted as an analysis of current DND SAR performance.

23. Slides 15, 16, and 17 contain the "raw" statistics for the proposed reaction performance indicators, in this case for the year 1988. The prime characteristics of the data distribution for the performance indicator is shown by the mean time, the standard deviation (STD), and the minimum and maximum values. (All times are in minutes.) The number of acceptable data points is shown (DATA). The general shape of

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the frequency distribution can be deduced from a listing of decile values. Each decile interval indicates the time interval within which 10 percent of the incidents (data values) occurred. For example, for mobilization in Slide 15, a DND resource was launched within 12 minutes in 10 percent of the SAR cases, while a resource was launched within 26 minutes in 20 percent of the SAR incidents, etc.

24. While these data contain much information, few insights are easily obtained. It is suggested that such data be provided in an annex to the SAR performance (indicator) report.

SLIDES 18-24

25. These slides contain charts of the plotted values of the mean, 30, 60 and 90 percentiles of the reaction performance indicators for the years 1988-1991. Also, shown on the chart are linear regression trend lines. The lines do not necessarily indicate that a trend is present; statistical analysis of the data would be required to confirm or deny the presence of a trend. However, the trend lines present a useful (but crude) indication of the likelihood of a trend and its magnitude and indicate where further statistical analysis is justified.

26. Performance indicators plotted in this fashion (and supported with statistical analysis) permit conclusions to be made regarding changes which may be evolving in the SAR system. For example, if it is assumed that the trends plotted in the chart for mobilization (Slide 18) have been shown to be statistically valid, it can be noted that the mobilization time for the 30 and 60 percentiles are effectively constant. The mobilization times for the 90 percentile are (sporadically) decreasing from which it can be concluded that the number of incidents with very long mobilization times are decreasing. But the average (mean) mobilization time is slowly but consistently increasing.

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SLIDES 25-31

27. These slides display charts where the percentiles for the reaction performance indicators have been plotted. The 100 percentile has been omitted to avoid making the vertical scale excessive to accommodate the extreme last point in the distribution and obscuring most of the detail in the rest of the distribution. Charts such as these permit patterns and emerging trends to be discerned.

28. For example, in Slide 25 Mobilization Trends, one can see that the distributions for the years 1988 to 1991 are approximately identical. One could conclude that there has been no increase or degradation in mobilization performance during this time period. Examination of the following slide of Transit Trends yields the conclusion that transit times in the last two years have generally increased by 10-20 minutes. It must be remembered that nothing can be concluded about what factor may have caused this slight increase. If it is believed that a trend such as this is serious, a detailed study should be initiated to determine the validity and possible cause of the observed trend.

SLIDE 32

29. This slide is representative of a coverage overlay map to address one of the response capability indicators. This slide is presented to provide a visual indication of type of display DAOR has in mind for this performance indicator. This particular map was drawn from some earlier work DAOR performed for the New SAR Helicopter (NSH) requirements study and should not be viewed as an "exact" proposal. DAOR is currently working towards developing a procedure that will produce a coverage overlay map in perspective and detail best to facilitate its interpretation.

30. It should be noted that the process to determine the coverage bounds relies on a program that considers the

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distribution of available refuelling locations, the limitations of the airframe, the locations of the operating bases, and the flight regulations applied. The program determines the best route for the aircraft to follow and which refuelling points to use to arrive at its destination. The program also determines the limit of travel for the aircraft if such a limit exists.

SLIDE 33

31. Like the previous slide, this slide is intended to be representative of the general form of the answer to the Time Contour performance indicator. Again, this particular chart was drawn from earlier work for the NSH. DAOR is currently examining how best to represent the information on the map. However, the intent is to display the ideal time taken by an aircraft to reach a given location and to show which locations are beyond the reach of the airframe. The same considerations apply to determine the optimum route as was mentioned for the previous slide, namely, airframe limitations, refuelling locations, and flight regulations.

SLIDE 34

32. A plot similar to the one shown here would be used to display the proportion of past incidents that were within the aircraft rescue range from the nearest refuelling point. This is calculated for all past incidents, not just those to which DND responded. This performance indicator provides an indication of the potential of DND resources to assist in a SAR incident. By examining for possible trends, one can determine if the geographic distribution of SAR incidents is changing such that the transit capabilities of DND aircraft are exceeded more frequently (indicating the requirement for modifications/updates or procurement). It should be noted that the data in this chart are totally fictitious.

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SLIDE 35

33. This chart displays the frequency of occurrence of the various levels of people on board (POB) aircraft and vessels in SAR incidents. This can be interpreted as potential lives at risk. The distributions for the four years shown indicate that little or no change is taking place over the years. The vast majority of SAR incidents involve fewer than 10 people.

SLIDE 36

34. This chart depicts the transport capability performance indicator for the current SAR helicopter. It identifies the helicopter's capability to transport all the lives at risk in an incident in one sortie. It can be seen that the current helicopter can transport all the lives at risk in one sortie in approximately 99 percent of all SAR incidents and that this transport performance is consistent year after year.

SLIDE 37

35. The following charts display typical results for the performance indicators quantifying Intensity response capability. This first slide identifies the annual load of SAR cases that the DND-operated rescue coordination centres must handle. From the chart, it can be seen that 1988 was a more intense year, while the RCC case load has been relatively constant from 1989 to 1991. The chart also displays how quantities of the various incident classes may be changing.

SLIDE 38

36. The annual incident load that DND primary SAR resources respond to is shown here. Again, the case load is broken down

- 12 -

by incident type. There appears to be a slight trend in decreasing case load. Statistical analysis would be required to confirm this and determine the confidence level. This display is proposed for the Primary Resource Demand performance indicator.

SLIDE 39

37. The values of the proposed lives at risk performance indicator are shown in this slide. These are the total number of lives at risk in all the SAR incidents to which DND primary SAR resources responded. This indicator provides an impression of the level of responsibility and importance of DND SAR resource activities. From the slide there appears to be a trend towards increasing lives at risk.

SLIDE 40

38. Statistical analysis has been mentioned several times in this briefing. It is required to support what may visually appear to be emerging trends in the data for the performance indicators. It was felt worthwhile to provide an example of the sort of statistical analysis that could be performed to validate a possible trend. For this example we will use the data of the previous chart for lives at risk. From the chart, it can be seen that there appears to be a trend of increasing level of lives at risk. The first statistical calculation that can be done is to determine the correlation coefficient between the level of lives at risk and the year. This value will indicate how well one can predict the lives at risk given the value for the year under consideration. For these data the correlation coefficient works out to be 0.961. For four points a value above 0.90 indicates that a conclusion that a correlation exists is justifiable. In this case, it could be concluded that there is a correlation in the data. The next step is to estimate the confidence level that can be associated with the hypothesis that the correlation is not

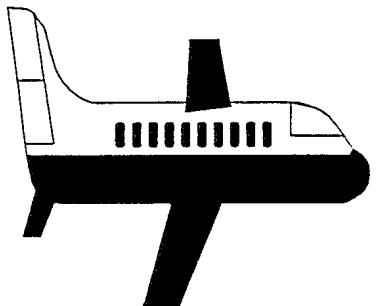
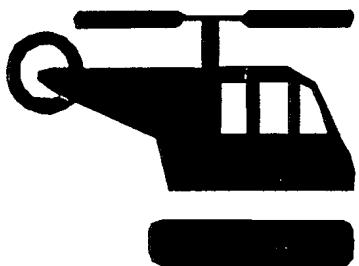
- 13 -

produced through random effects. For this, a Pitman statistical test can be applied to the data. The Pitman test is a non-parametric test to estimate the probability that the data are independent. In the case at hand, the two-sided significance level is 0.0797, which is to say that there is a 7.97 percent chance that the observed trend is produced by random chance. This can be interpreted as stating that there is very strong evidence that the trend is valid (nothing is ever certain in statistics). From all of this one could assume that it is reasonably safe to state that there is a trend towards an increasing annual total of lives at risk for SAR incidents to which DND resources respond.

SLIDE 41

39. In conclusion, it is felt that the Search and Rescue performance indicators proposed provide a broadly based evaluation of the performance of the DND SAR system. They can be used to inform the public of DND's contribution to SAR and the level of performance that can be expected. The indicators provide a means to identify, in a timely manner, when significant changes to the system are occurring and additional detailed investigation is required. The proposed performance indicators provide support for SAR planning and decision-making.

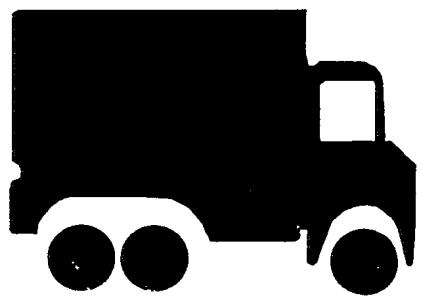
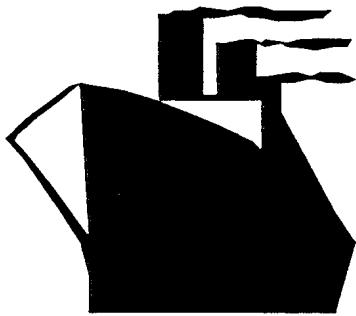
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SEARCH AND RESCUE

PERFORMANCE INDICATORS

DAOR 1993



SLIDE 1

- 15 -

SAR PERFORMANCE INDICATORS STUDY REQUEST

"... identify specific performance indicators that can be used to measure the level of service provided to the Canadian public. These performance indicators could also be used to evaluate the delivery of SAR services. "

"... identify appropriate performance indicators related to the DND SAR programme with a view to quantifying the baseline level of service provided at the current time. The study should include all aspects of the Department's air and marine mandate. "

3385-9-15 (DAOT 5) dated 5 Jun 92

SLIDE 2

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Search and Rescue Performance Indicators

Selection Criteria:

*Only measures of effectiveness
on which DND could have some
impact would be appropriate.*

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SAR PERFORMANCE INDICATORS UTILITY/REQUIREMENT

- identify current level of performance
- support comparison with past performance
- permit analysis for early warning of changes and trends
- allow specification of/comparison with SAR goals and standards
- provide support for SAR planning and decision-making

Search and Rescue Performance Indicators

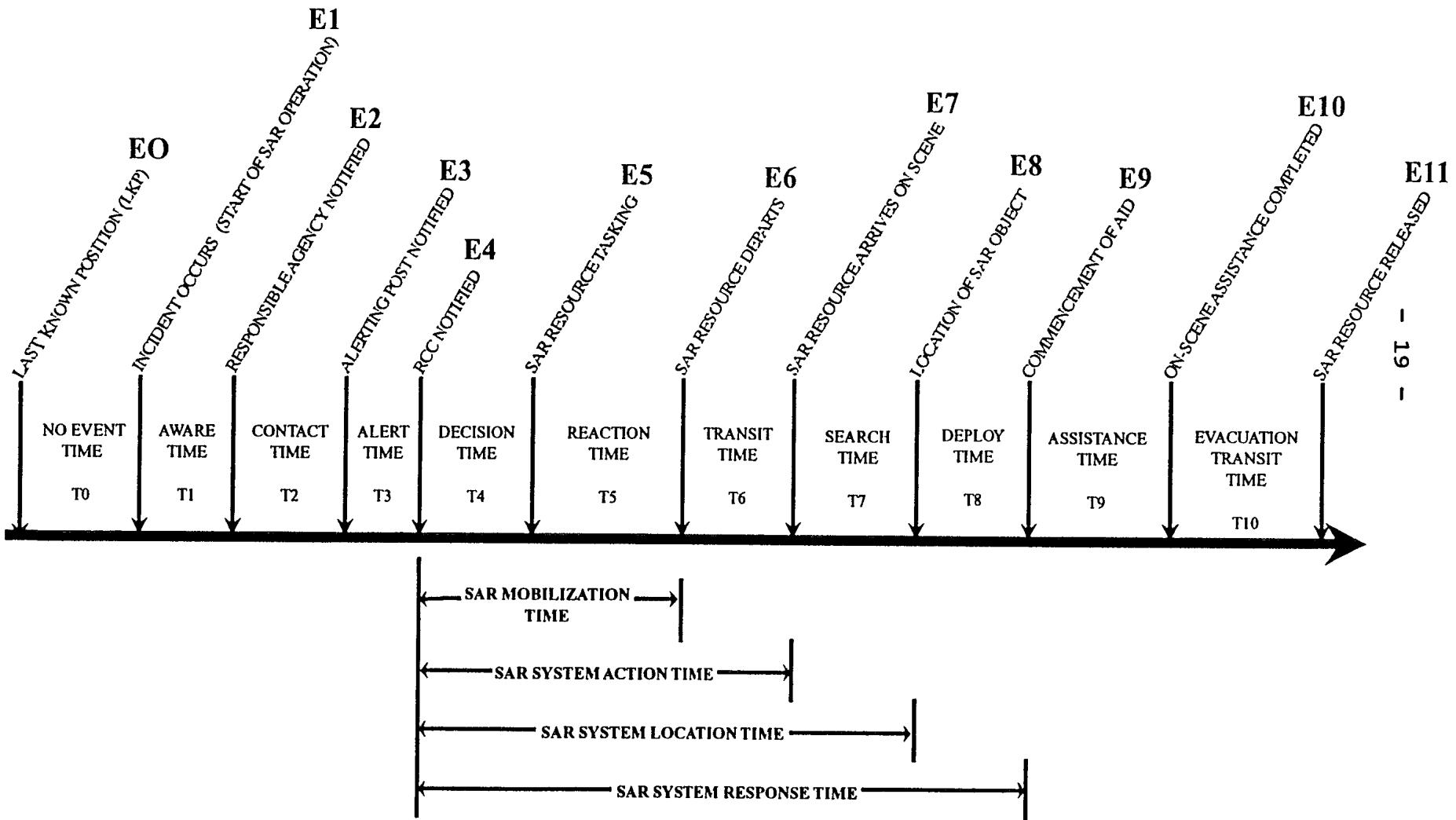
1. Reaction Capability

- Basic Measures
- Composite Measures

2. Response Capability

- Coverage
- Relative Response
Capability
- Intensity

SAR INCIDENT TIME LINE



- 20 -

SAR Performance Indicators

Reaction Capability

Basic Measures

1. SAR Mobilization Time

Time from RCC notification to time first SAR resource departs.

Decision time (T4) + Reaction Time (T5)
Addresses adequacy of RCC procedures & support equipment and MOB alert postures.

2. Resource Transit Time (T6)

Addresses adequacy of resource speed, endurance, and base location.

3. SAR Search Time (T7)

For incidents where object is found.
Addresses adequacy of resources search capability.

4. Rescue Deploy Time (T8)

Addresses adequacy of resource capability to deploy SARTechs and equipment.

SAR Performance Indicators Reaction Capability

Composite Measures

5. SAR System Action Time

Mobilization time + transit time
(T4+T5+T6)

Indicator for time to arrive on-scene from RCC notification.

6. SAR System Location Time

Sar System Action Time + Search Time (T4+T5+T6+T7)

Indicator for time to locate object from RCC notification.

7. SAR System Response Time

System Location Time + Deploy Time (T4+T5+T6+T7+T8)

Indicator for time to provide medical assistance from RCC notification.

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SAR Performance Indicators Response Capability

Coverage

1. Coverage Overlay Maps

Maps showing all areas which can be reached by SAR resources.

2. Time Contour Maps

Maps displaying contours for resource transit time from base.

Relative Response Capability

3. Transit Capability

Proportion of past SAR incidents within resource rescue range from nearest refueling location.

4. Transport Capability

Proportion of past SAR incidents where total lives at risk could be accommodated by one sortie.

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SAR Performance Indicators Response Capability

Intensity

1. RCC Case Load

Annual number of SAR incidents which RCC handled.

2. Primary Resource Demand

Annual number of incidents to which DND primary SAR resources responded.

3. Lives at Risk

Number of lives at risk in incidents where DND primary SAR resources were involved.

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SAR Performance Indicators Selection Rationale

1. Reaction time is critical in the SAR process to save lives.
2. Reaction capability has been utilized prominently in past evaluations of the SAR system.
(Cross Commission Report, NDHQ Program Evaluation E1/90, etc)
3. Important to be aware of gaps and weak areas in SAR coverage and limits of resource response capability.
4. Must be able to identify when changes are beginning to occur in the SAR system.
5. Must have a sound foundation for decision making and planning.

SAR Performance Indicators

Inherent Factors

Performance Indicators

Mobilization Time

Transit Time

Search Time

Deploy Time

Factors

- incident validation procedure
- resource readiness
- preparation and launch time
- resource availability

- resource speed & endurance
- case geographic distribution
- base locations
- refueling locations
- weather capability

- resource search capability
- environmental characteristics
- search procedures
- ELT assistance
- fleet size & availability

- a/c deployment capability
- system response capability

SAR Performance Indicators

Inherent Factors (continued-1)

Performance Indicators

Composite Reactive Measures

Coverage Overlay Map

Time Contour Map

Transit Capability

Transport Capability

Factors

- same factors as for basic reactive measures

- resource endurance
- base locations
- refueling locations

- resource speed & endurance
- base locations
- refueling locations

- case geographic distribution
- resource endurance
- base & refueling locations

- case lives-at-risk distribution
- resource transport capacity

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SAR Performance Indicators Inherent Factors (continued-2)

Performance Indicators

RCC Case Load

Primary Resource Demand

Lives at Risk

Factors

- number of SAR incidents by category
- demand on RCC operation
- demand on DND primary SAR resources
- demands on and importance of DND SAR response

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SAR PERFORMANCE INDICATORS

1988

BASIC MEASURES OF REACTION PERFORMANCE

OVERALL SAR MOBILIZATION STATISTICS FOR THE PERIOD 1988

MEAN	148	1 DECILE	12
STD	289	2 DECILE	26
MIN	1	3 DECILE	44
MAX	4468	4 DECILE	65
		5 DECILE	81
		6 DECILE	98
		7 DECILE	123
		8 DECILE	175
		9 DECILE	339
		10 DECILE	4468
DATA	775		

OVERALL SAR RESOURCE TRANSIT STATISTICS FOR THE PERIOD 1988

MEAN	65	1 DECILE	11
STD	100	2 DECILE	20
MIN	1	3 DECILE	30
MAX	1479	4 DECILE	38
		5 DECILE	45
		6 DECILE	57
		7 DECILE	70
		8 DECILE	88
		9 DECILE	120
		10 DECILE	1479
DATA	571		

OVERALL SAR RESOURCE SEARCH STATISTICS FOR THE PERIOD 1988

MEAN	224	1 DECILE	10
STD	540	2 DECILE	18
MIN	1	3 DECILE	28
MAX	5817	4 DECILE	44
		5 DECILE	61
		6 DECILE	95
		7 DECILE	131
		8 DECILE	184
		9 DECILE	477
		10 DECILE	5817
DATA	255		

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OVERALL SAR RESOURCE DEPLOYMENT STATISTICS FOR THE PERIOD 1988

MEAN	222	1 DECILE	4
STD	545	2 DECILE	8
MIN	1	3 DECILE	15
MAX	4398	4 DECILE	29
		5 DECILE	43
		6 DECILE	59
		7 DECILE	124
		8 DECILE	230
		9 DECILE	560
		10 DECILE	4398
DATA	111		

COMPOSITE MEASURES OF REACTION PERFORMANCE

SAR SYSTEM ACTION TIME STATISTICS FOR THE PERIOD 1988

MEAN	189	1 DECILE	23
STD	300	2 DECILE	49
MIN	1	3 DECILE	79
MAX	4567	4 DECILE	101
		5 DECILE	120
		6 DECILE	144
		7 DECILE	184
		8 DECILE	245
		9 DECILE	405
		10 DECILE	4567
DATA	735		

SAR SYSTEM LOCATION TIME STATISTICS FOR THE PERIOD 1988

MEAN	340	1 DECILE	33
STD	609	2 DECILE	50
MIN	3	3 DECILE	82
MAX	6661	4 DECILE	119
		5 DECILE	166
		6 DECILE	230
		7 DECILE	305
		8 DECILE	412
		9 DECILE	724
		10 DECILE	6661
DATA	406		

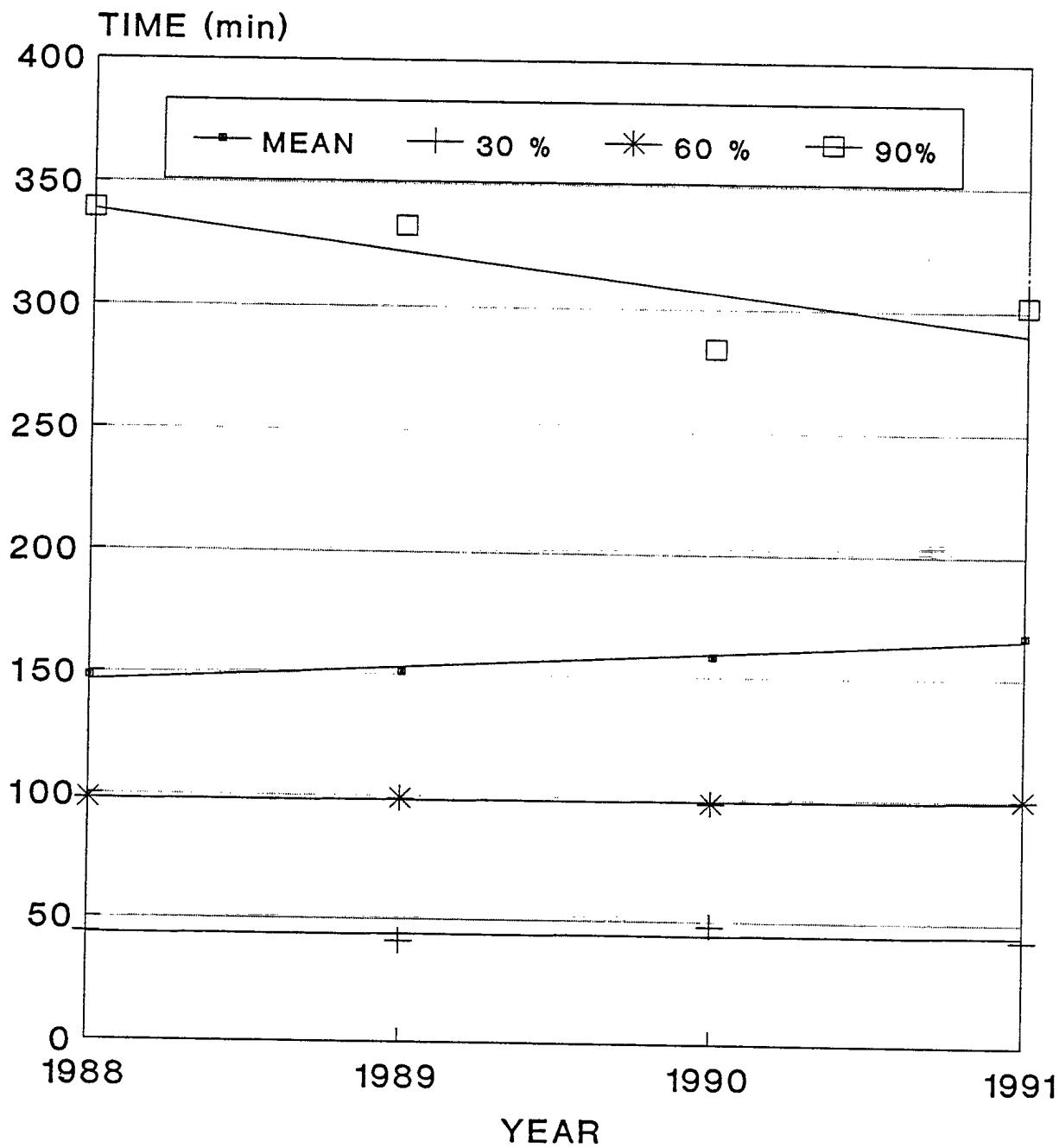
- 30 -

SAR SYSTEM LOCATION TIME STATISTICS FOR THE PERIOD 1988

MEAN	188	1 DECILE	23
STD	297	2 DECILE	48
MIN	1	3 DECILE	79
MAX	4567	4 DECILE	101
		5 DECILE	120
		6 DECILE	145
		7 DECILE	181
		8 DECILE	245
		9 DECILE	399
		10 DECILE	4567
DATA	735		

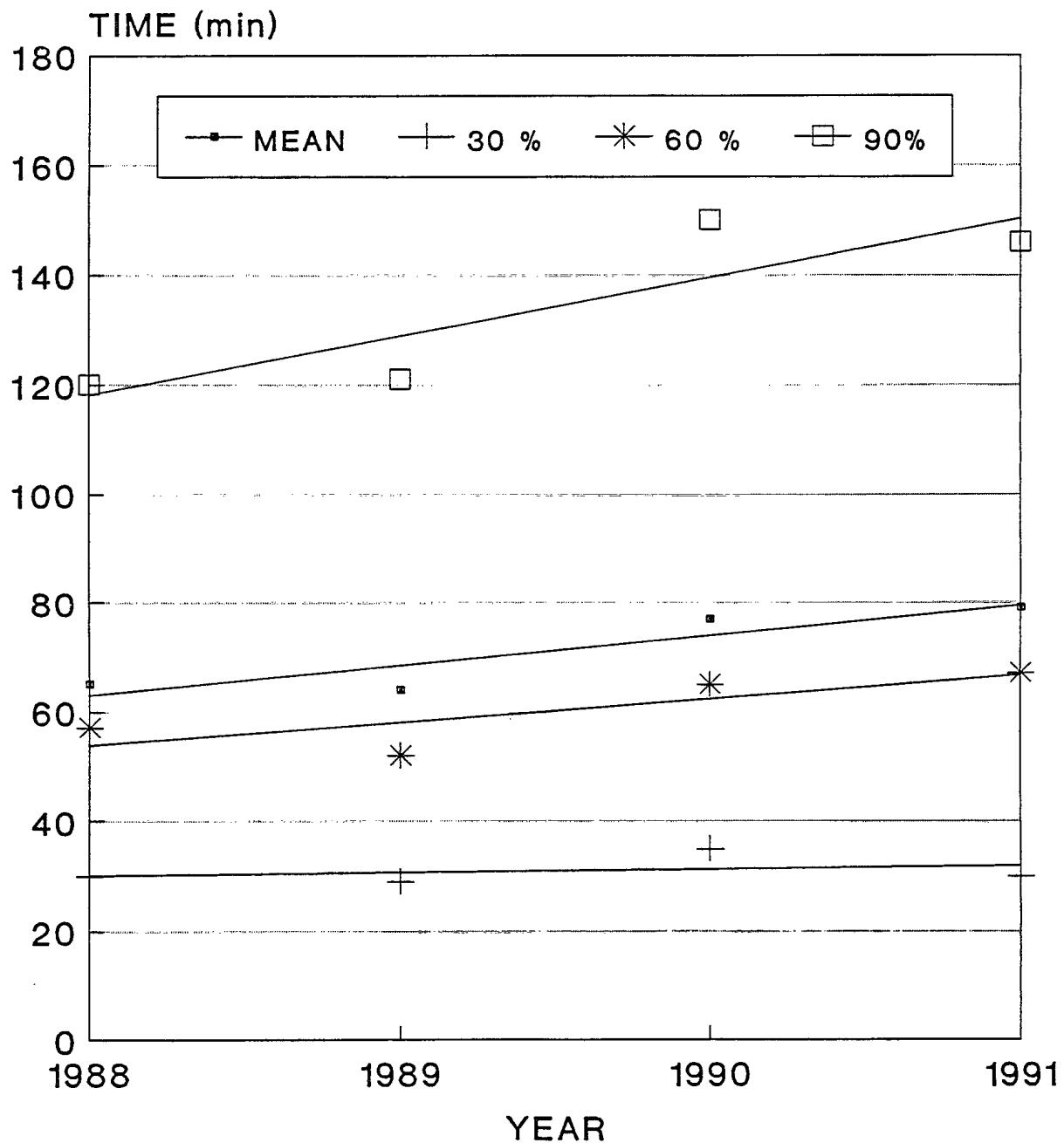
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SAR PERFORMANCE INDICATOR MOBILIZATION



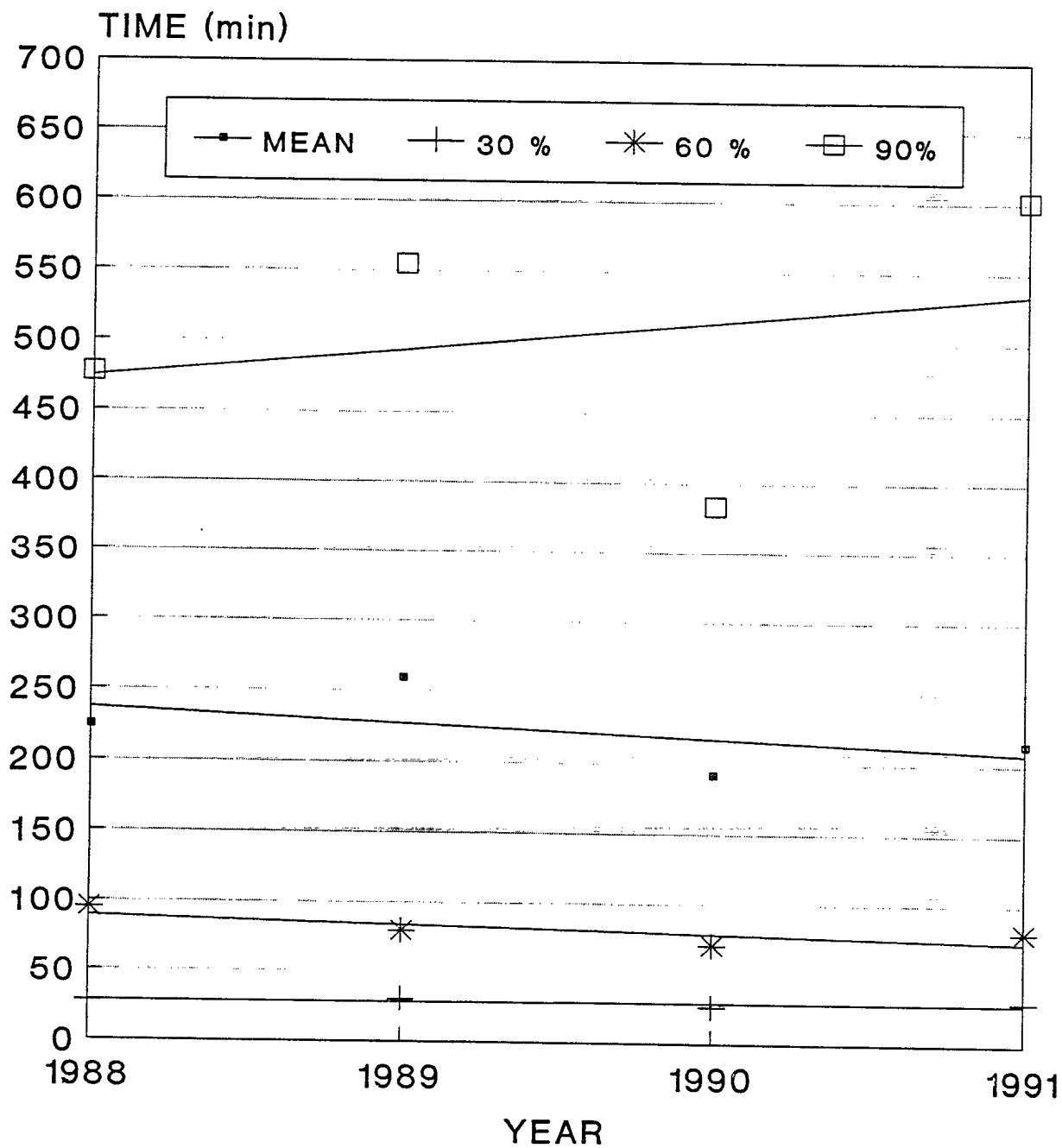
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SAR PERFORMANCE INDICATOR TRANSIT



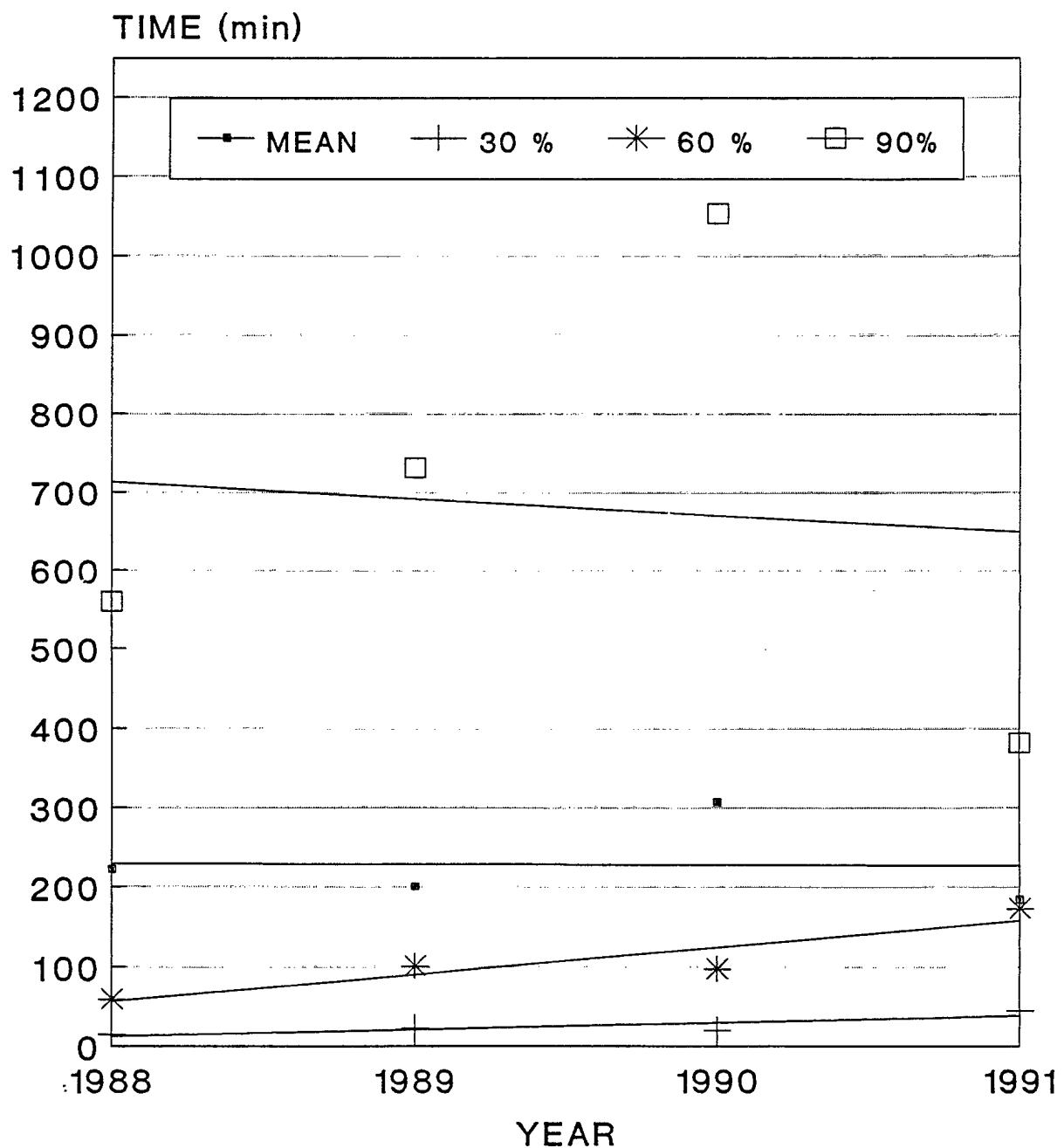
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SAR PERFORMANCE INDICATOR SEARCH

ARRIVAL ON-SCENE TO OBJECT LOCATEDSLIDE 20

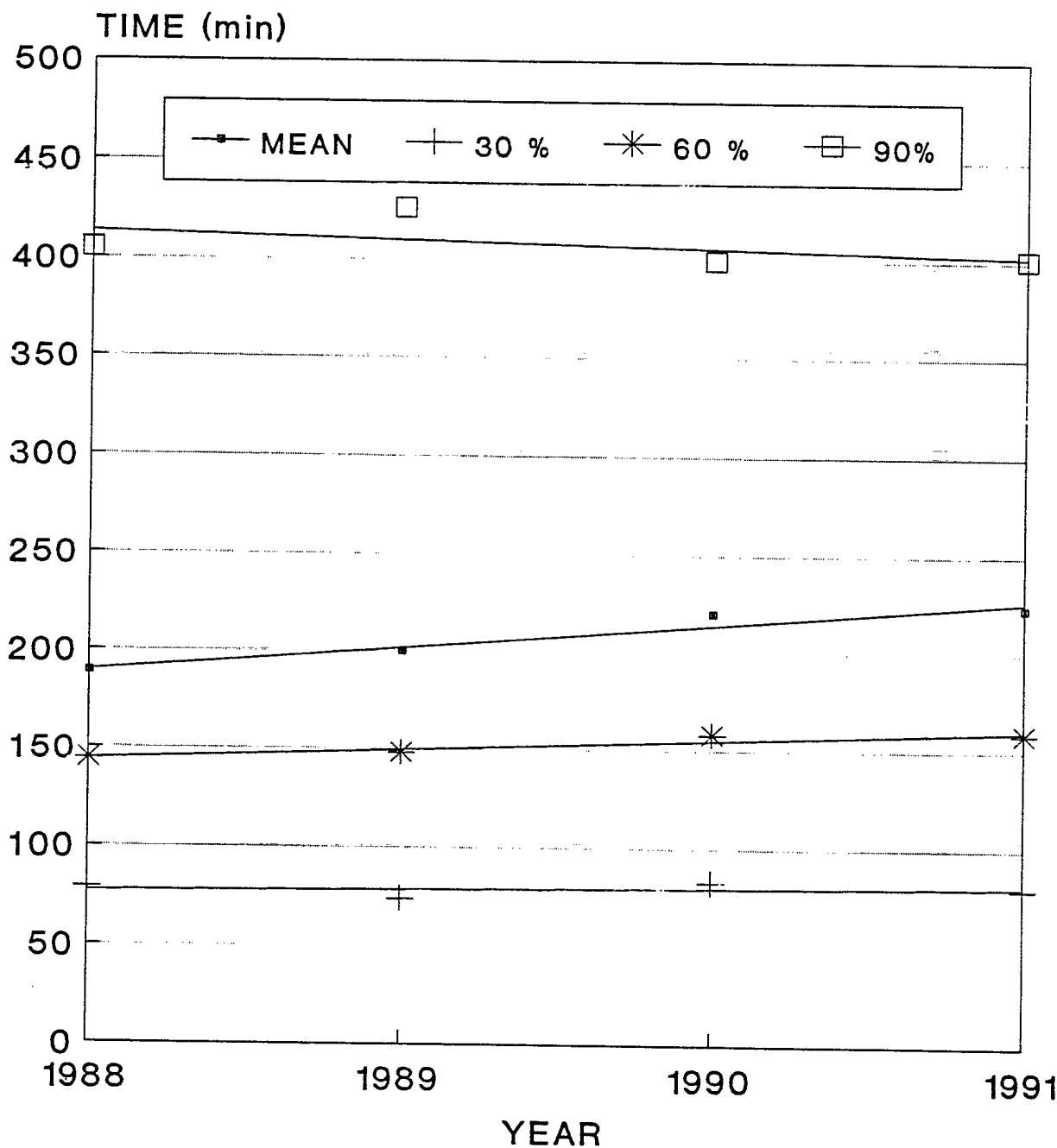
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SAR PERFORMANCE INDICATOR DEPLOYMENT

OBJECT LOCATED TO ASSISTANCE PROVIDEDSLIDE 21

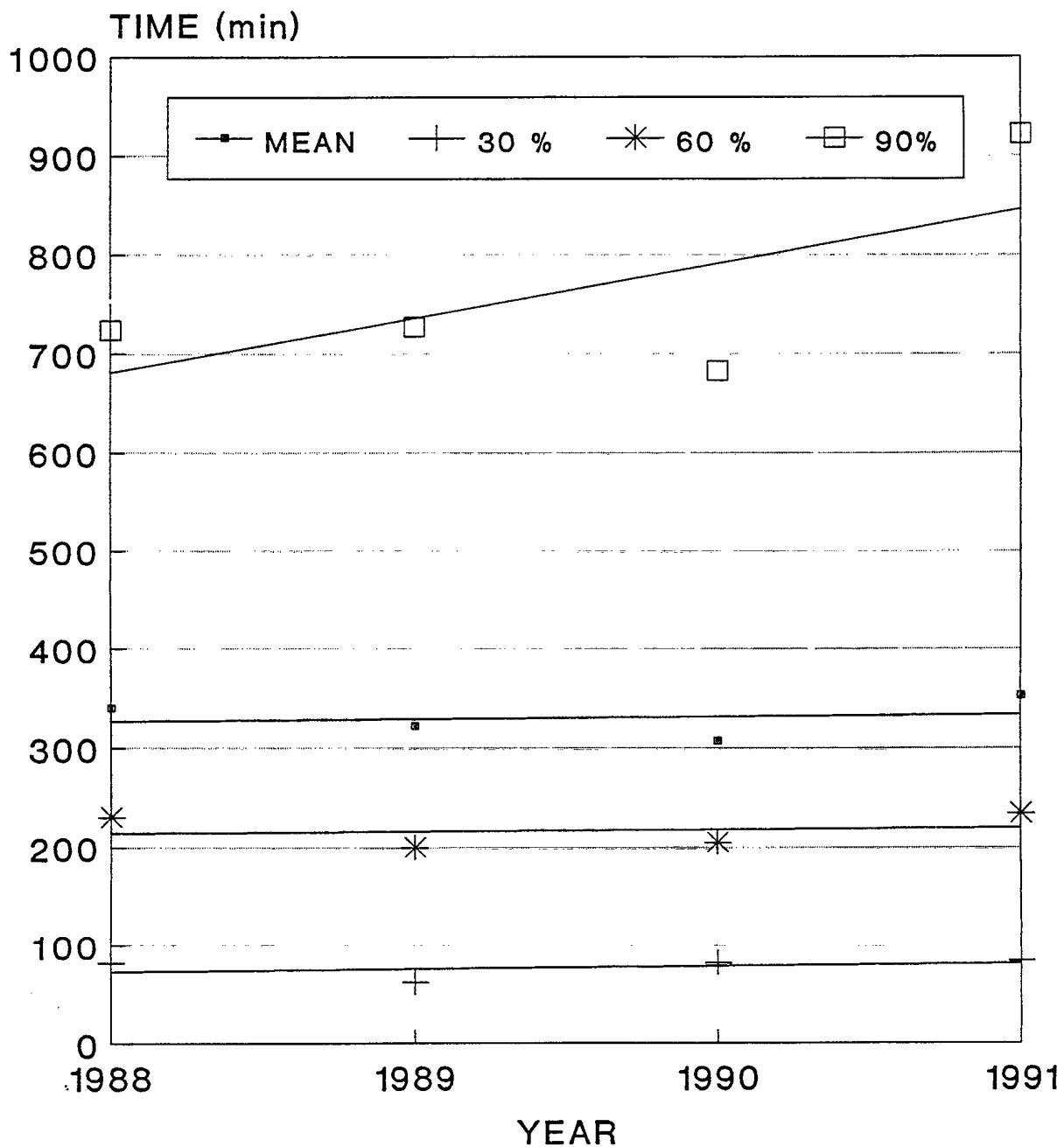
- 35 -

SAR PERFORMANCE INDICATOR SYSTEM ACTION TIME



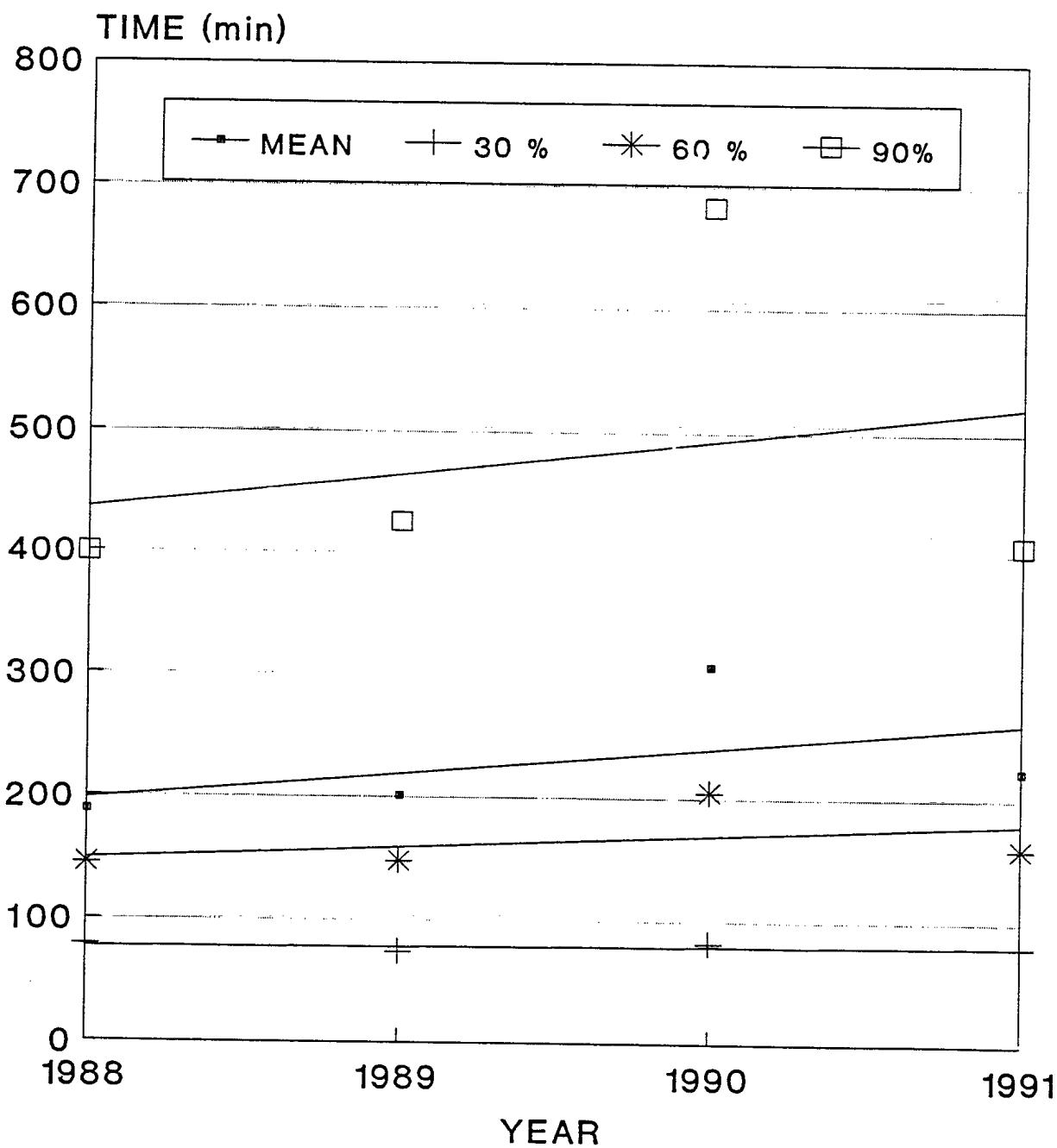
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SAR PERFORMANCE INDICATOR SYSTEM LOCATION TIME

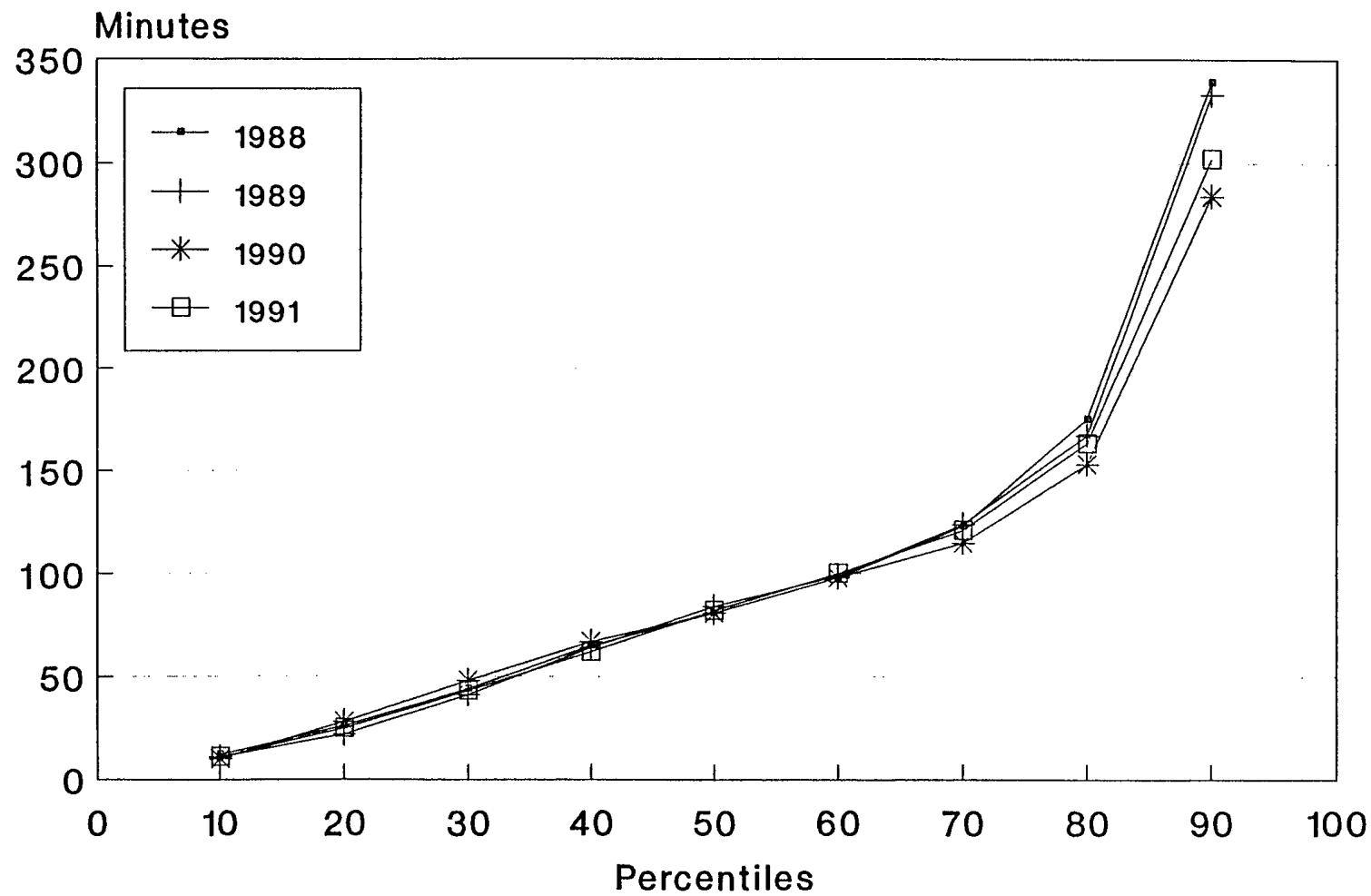


- 37 -

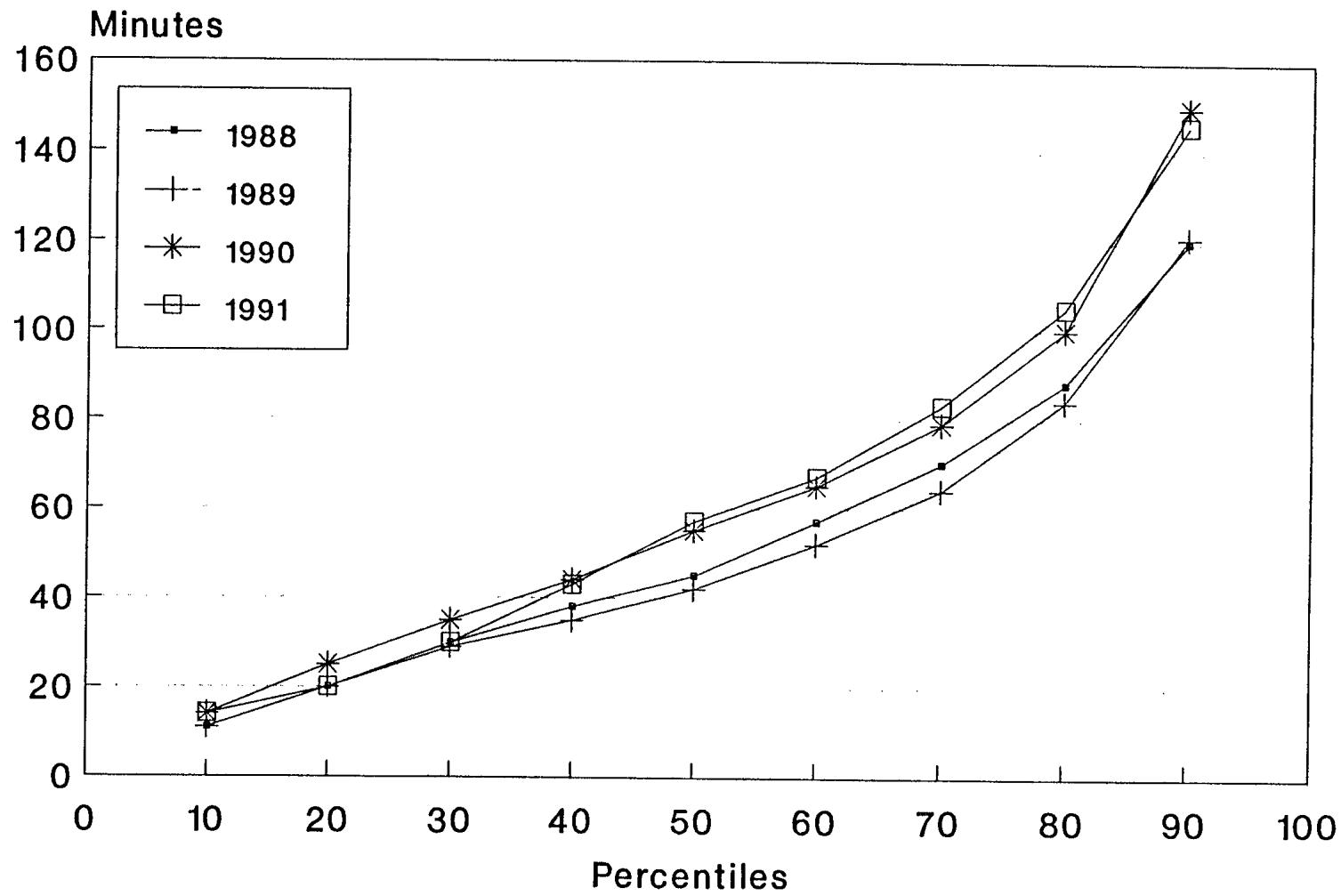
SAR PERFORMANCE INDICATOR SYSTEM RESPONSE TIME



SAR MOBILIZATION TRENDS (1988-1991)



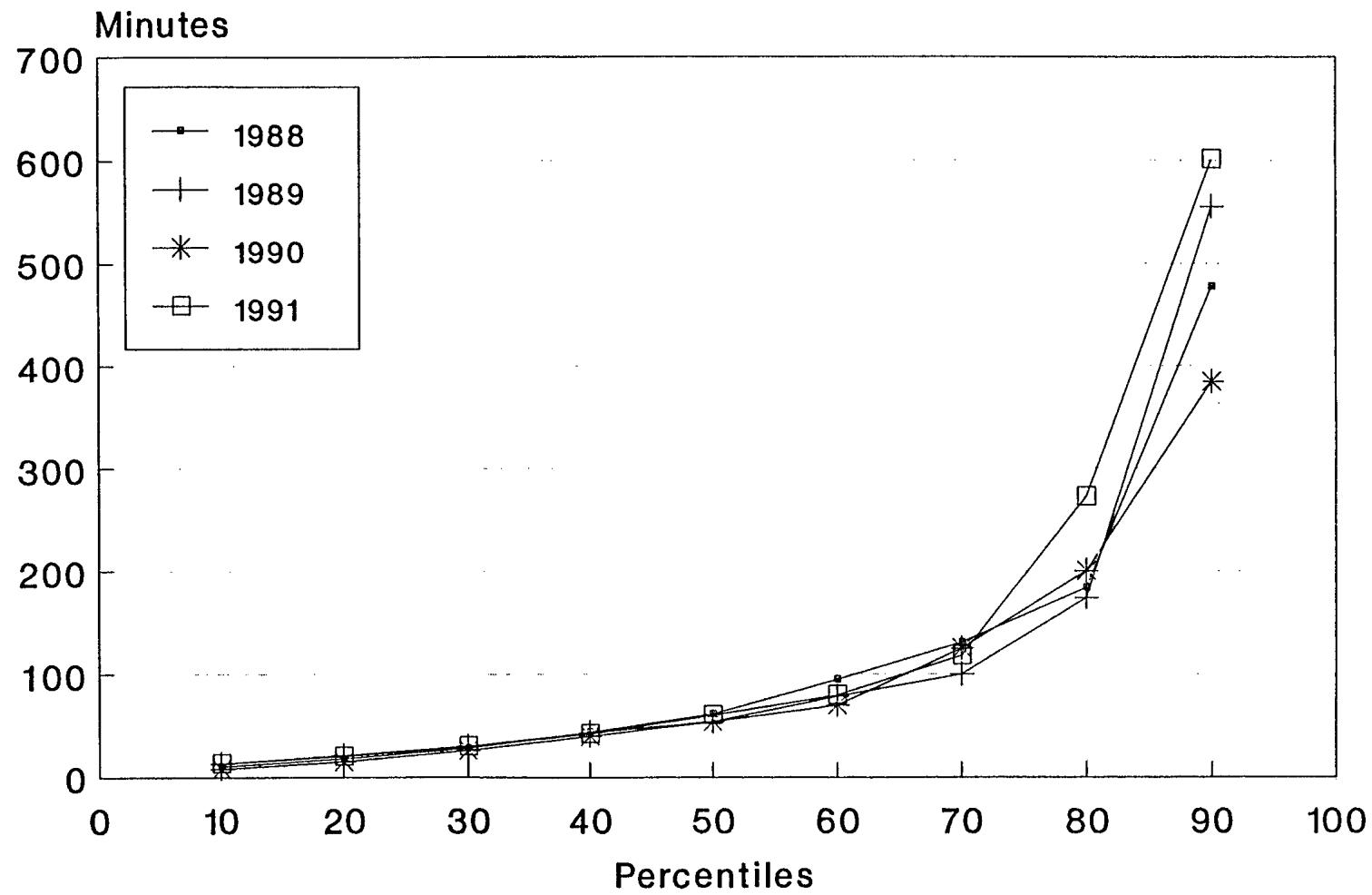
SAR TRANSIT TRENDS (1988-1991)



RESOURCE LAUNCH TO ARRIVAL ON-SCENE

SLIDE 26

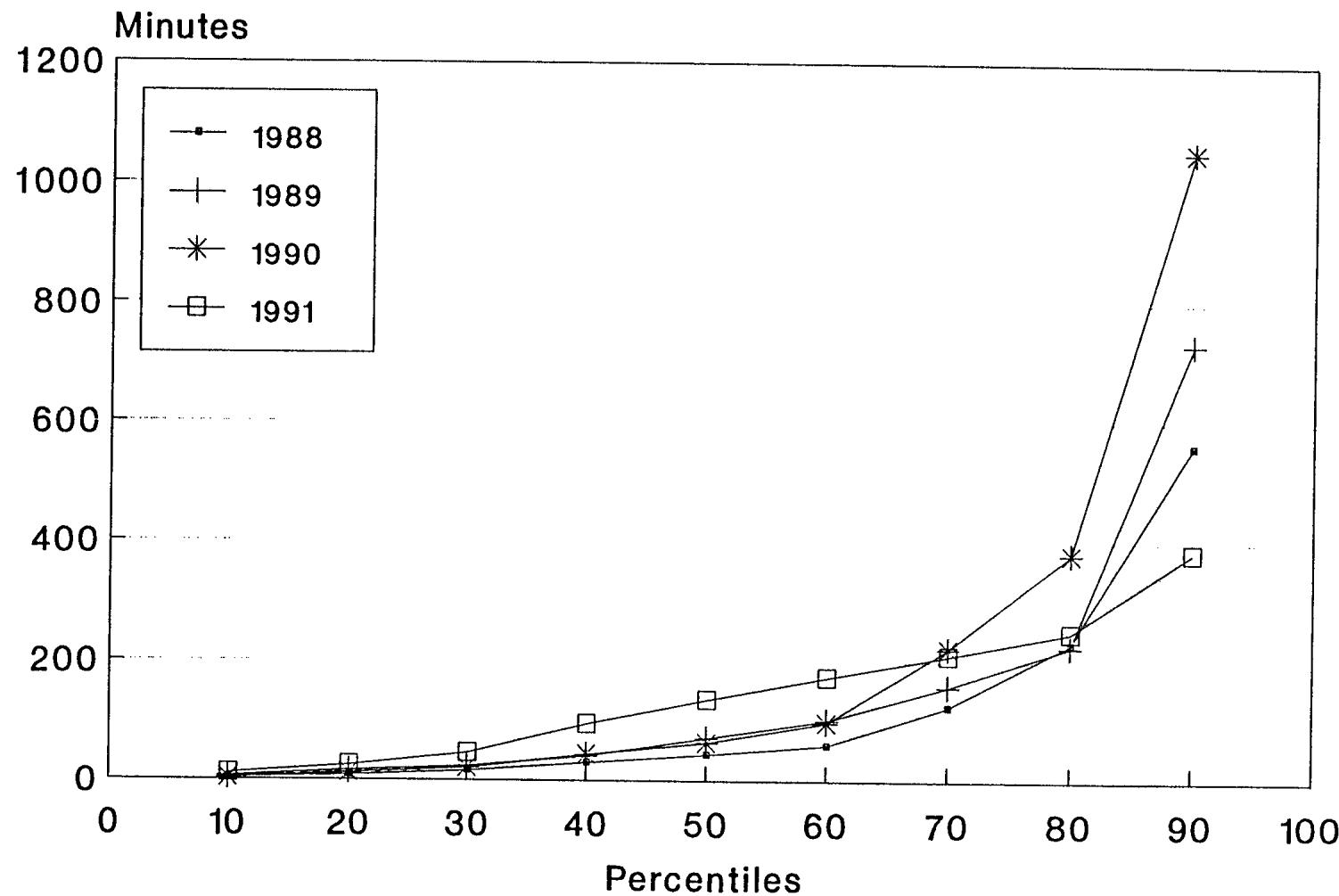
SAR SEARCH TRENDS (1988-1991)



RESOURCE ON-SCENE TO OBJECT LOCATED

SLIDE 27

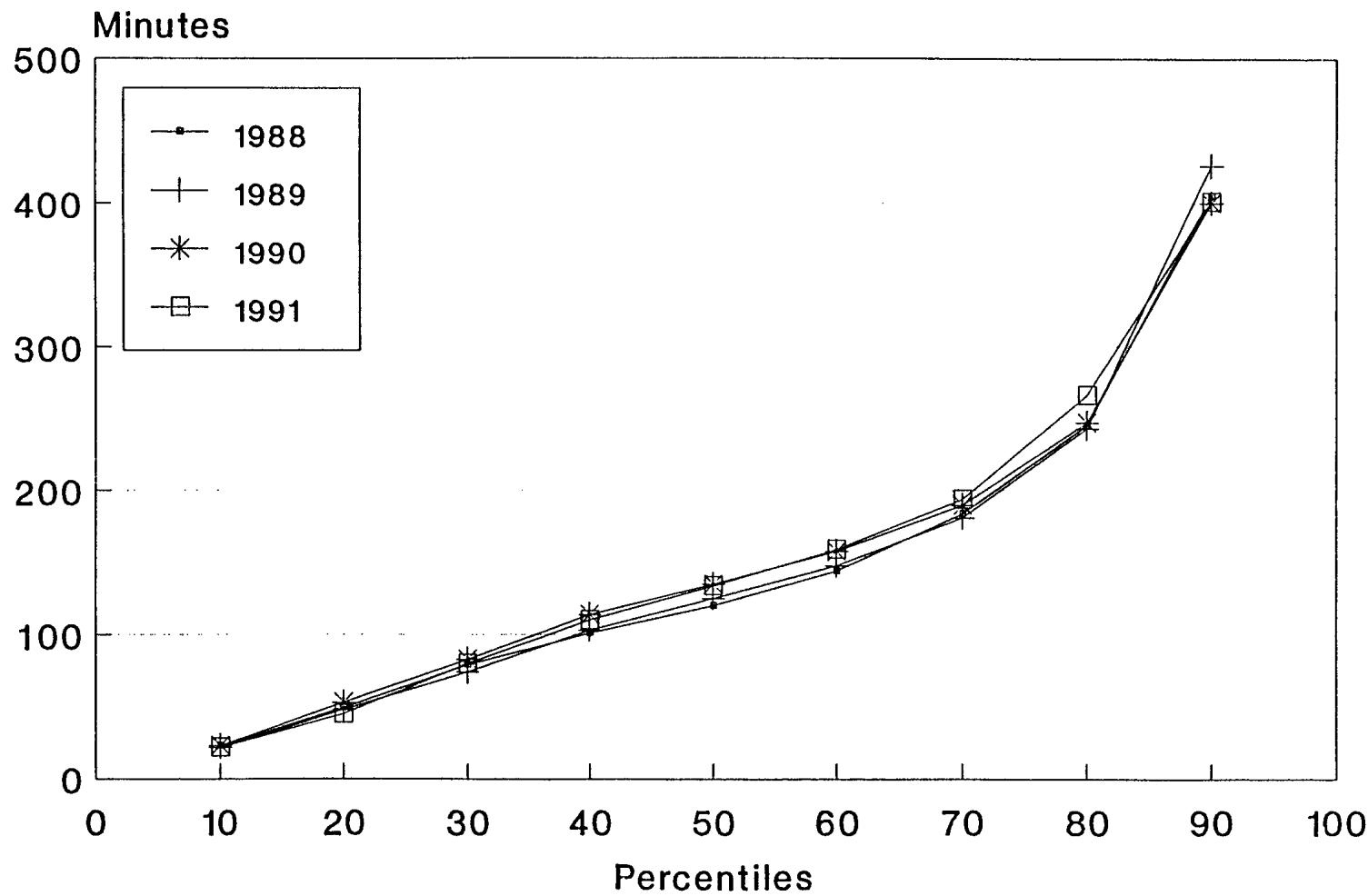
SAR DEPLOYMENT TRENDS (1988-1991)



OBJECT LOCATED TO ASSISTANCE PROVIDED

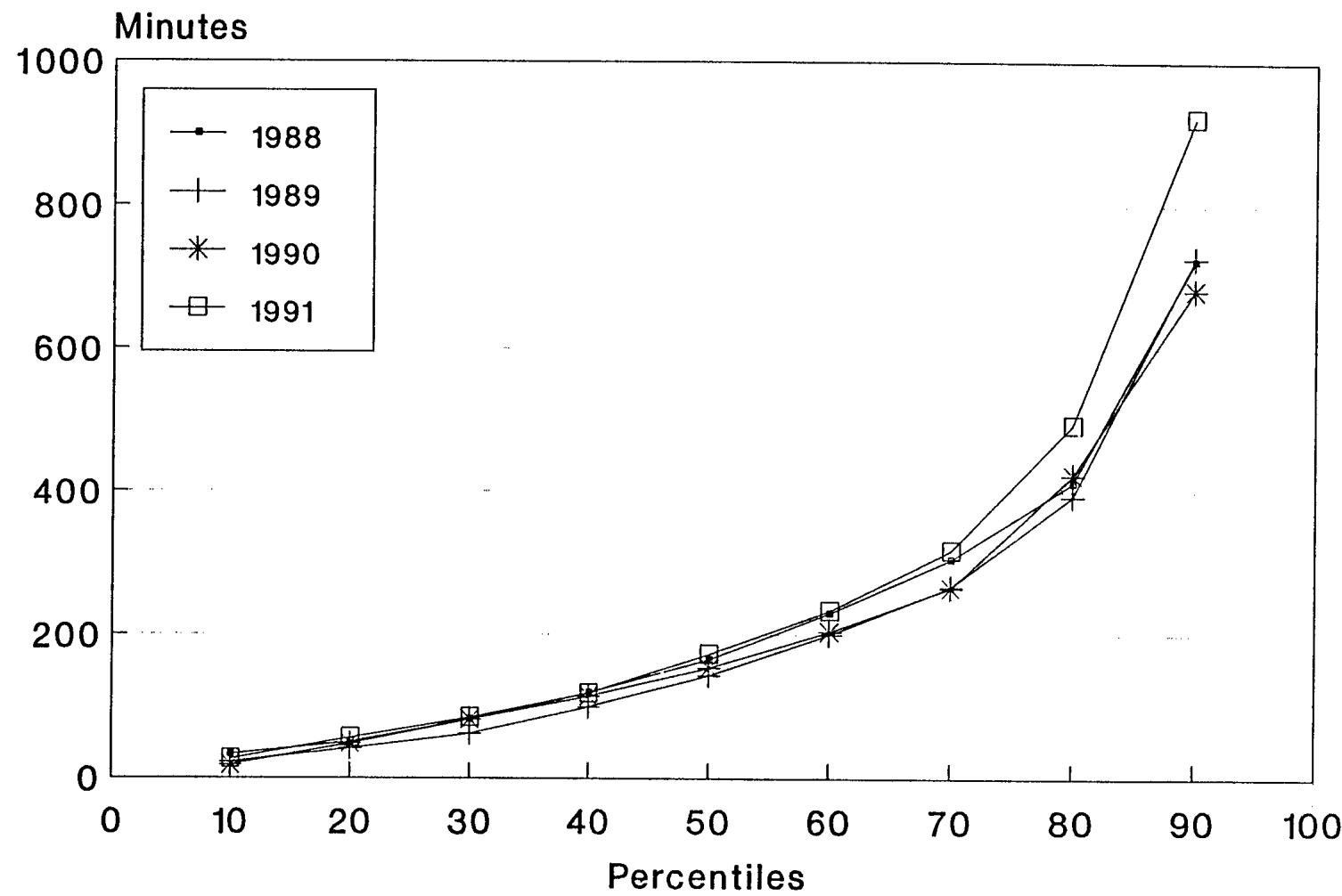
SLIDE 28

SAR SYSTEM ACTION TRENDS (1988-1991)

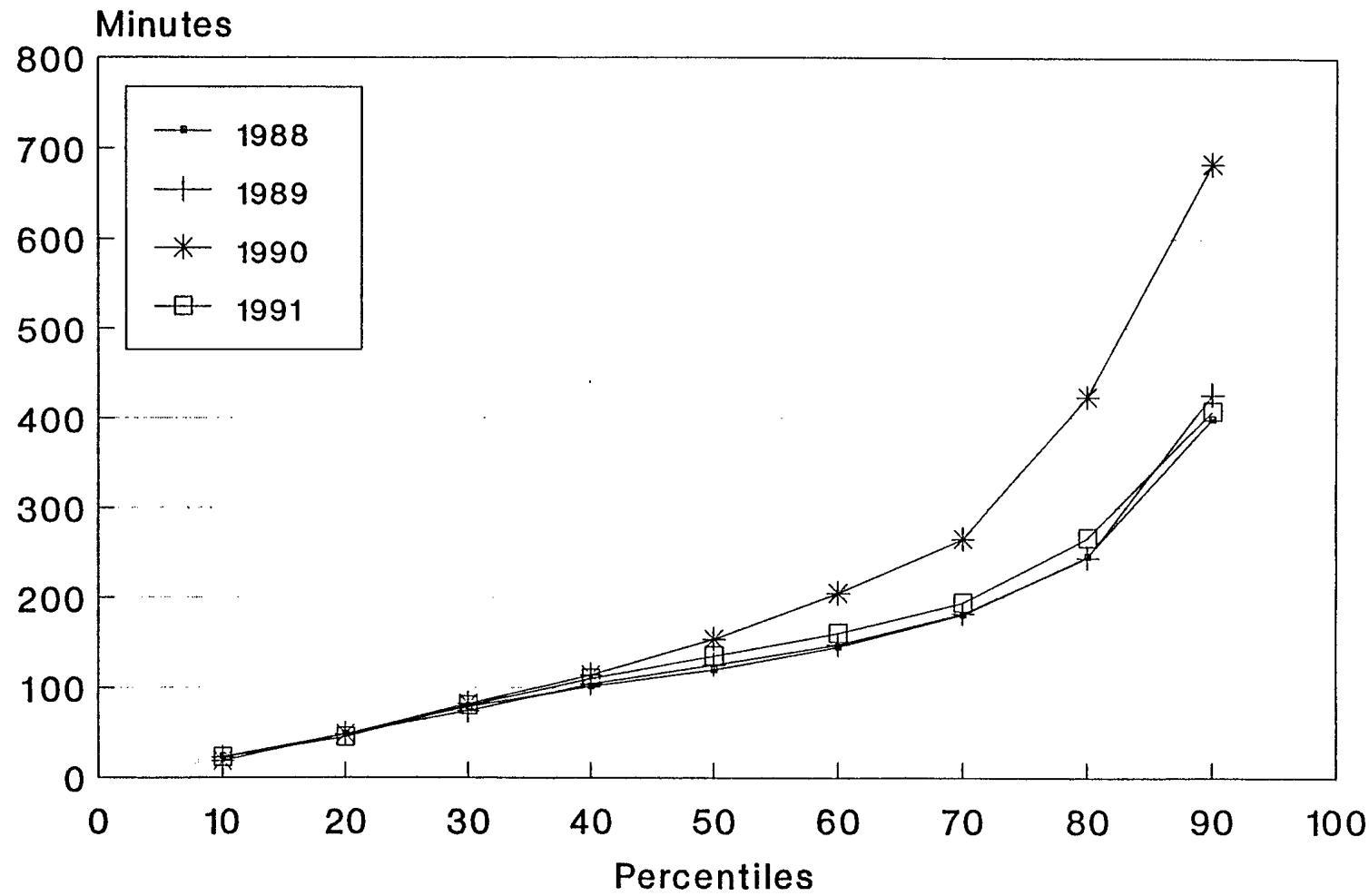


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SAR SYSTEM LOCATION TRENDS (1988-1991)



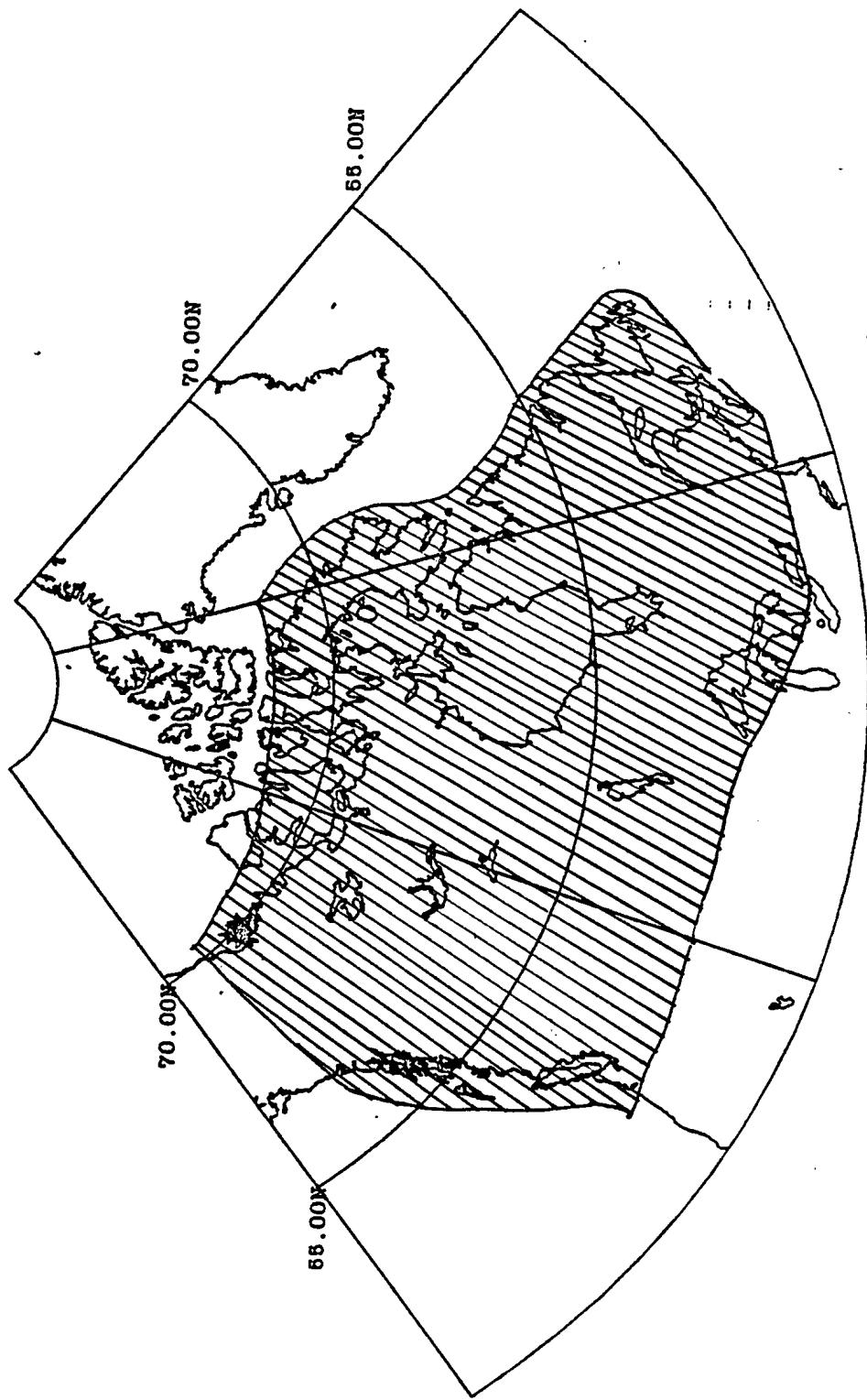
SAR SYSTEM RESPONSE TRENDS (1988-1991)



SAR COVERAGE OVERLAY MAP
- CH113 -

- 45 -

SLIDE 32



SAR TIME CONTOUR MAP

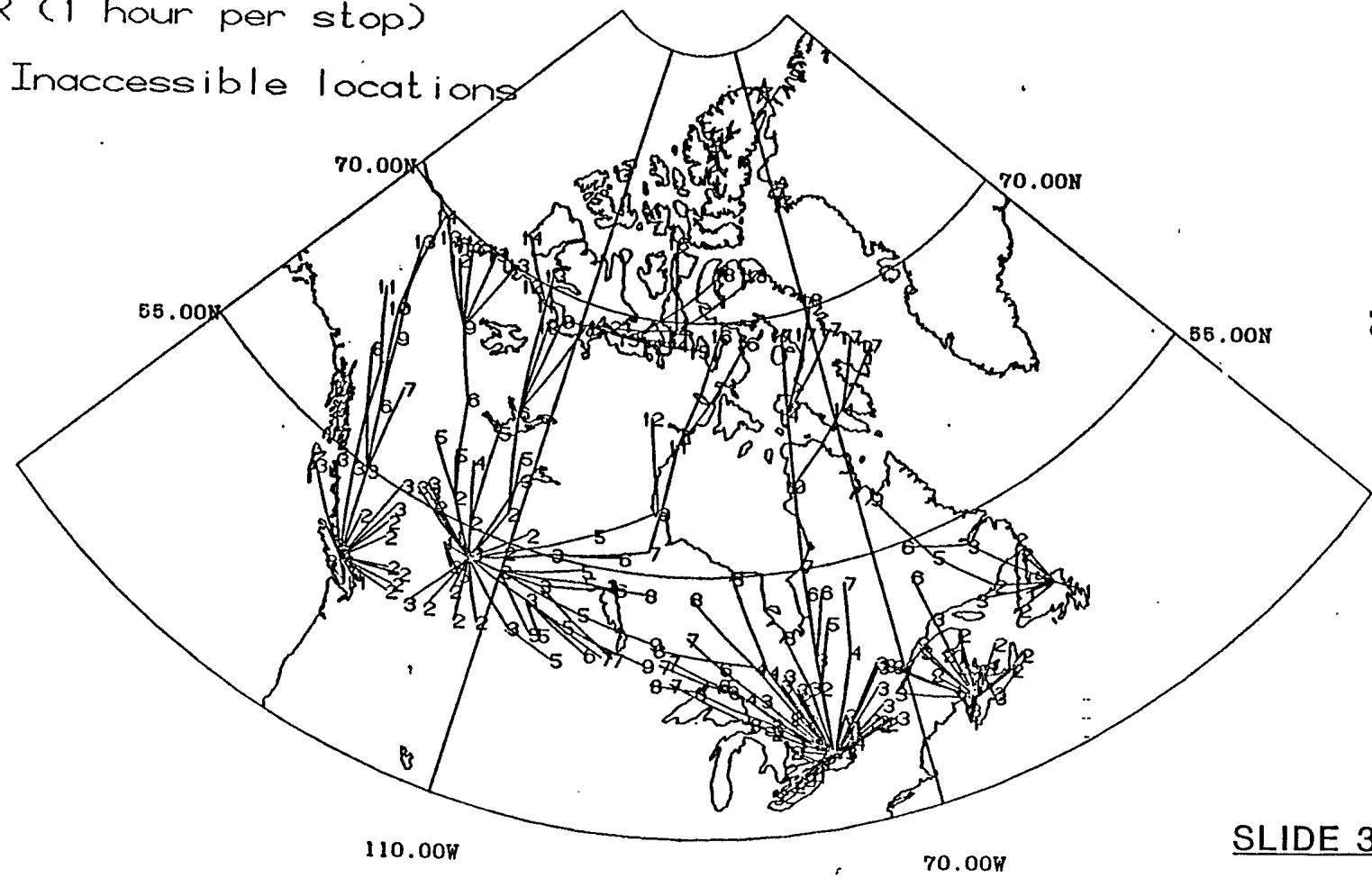
- CH113 -

Speed: 120 Knots

Hop Distance: 550 NM

IFR (1 hour per stop)

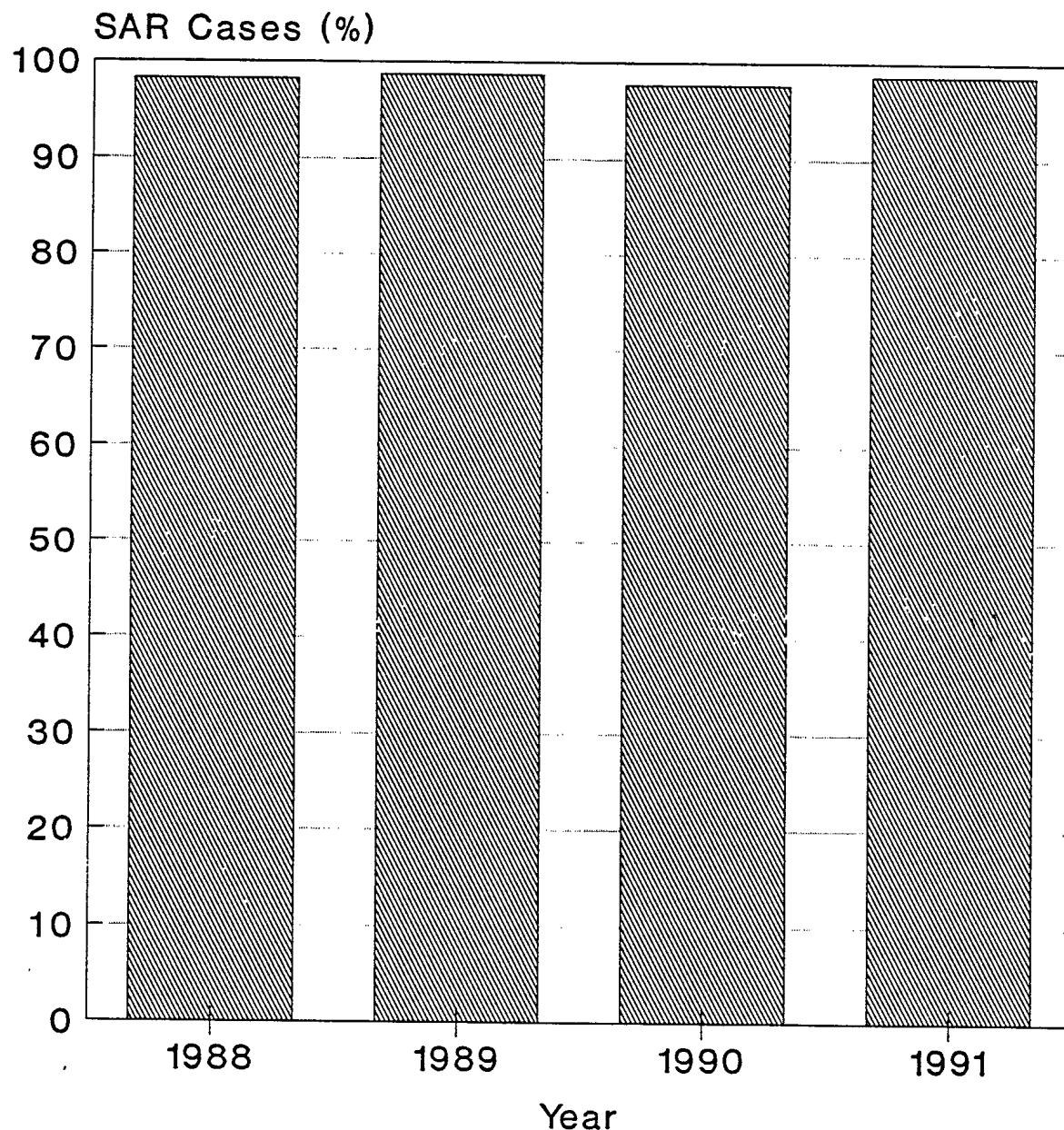
★: Inaccessible Locations



SLIDE 33

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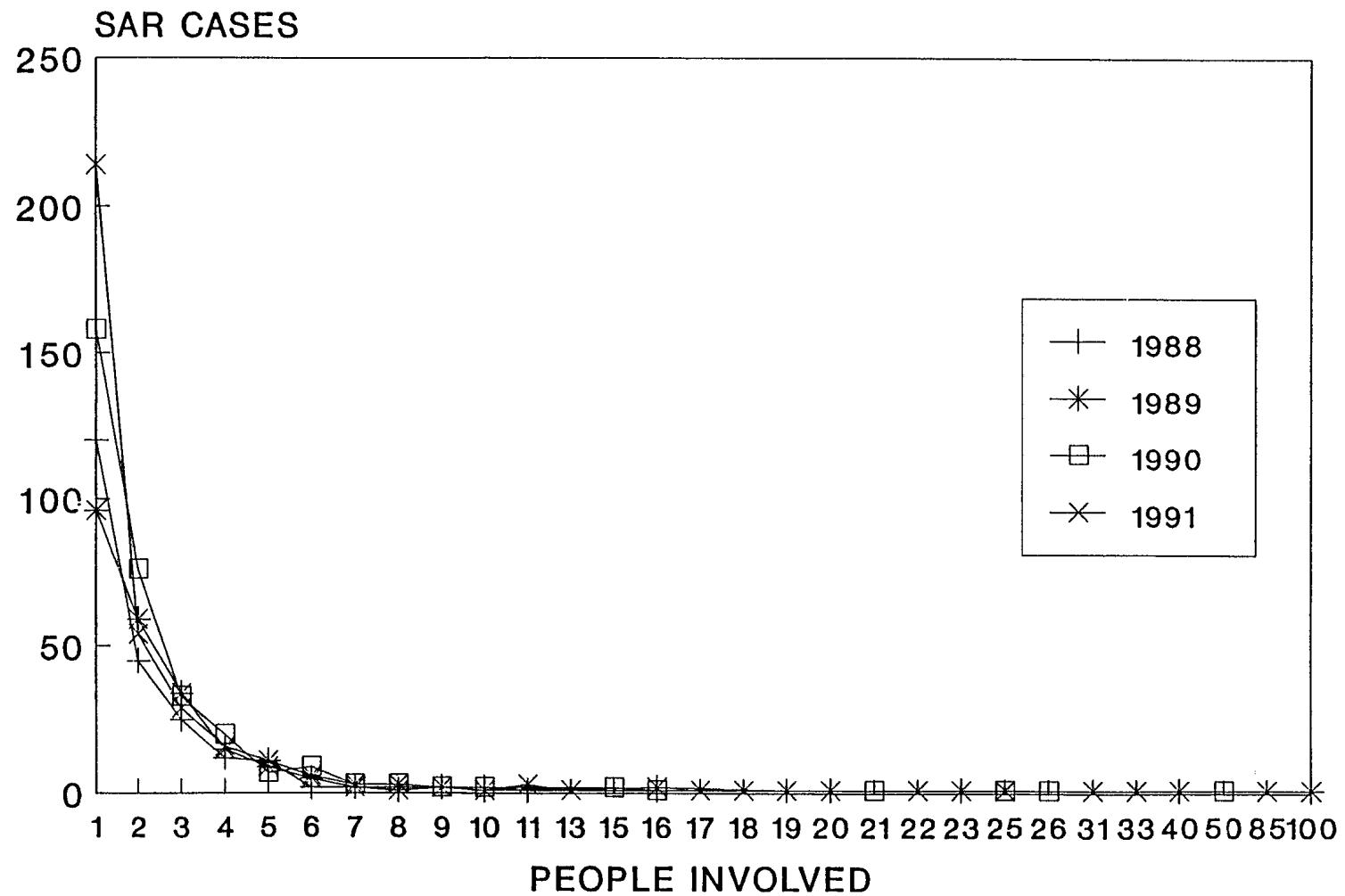
SAR PERFORMANCE INDICATOR RESPONSE - TRANSIT CAPABILITY VFR Flight Regulations



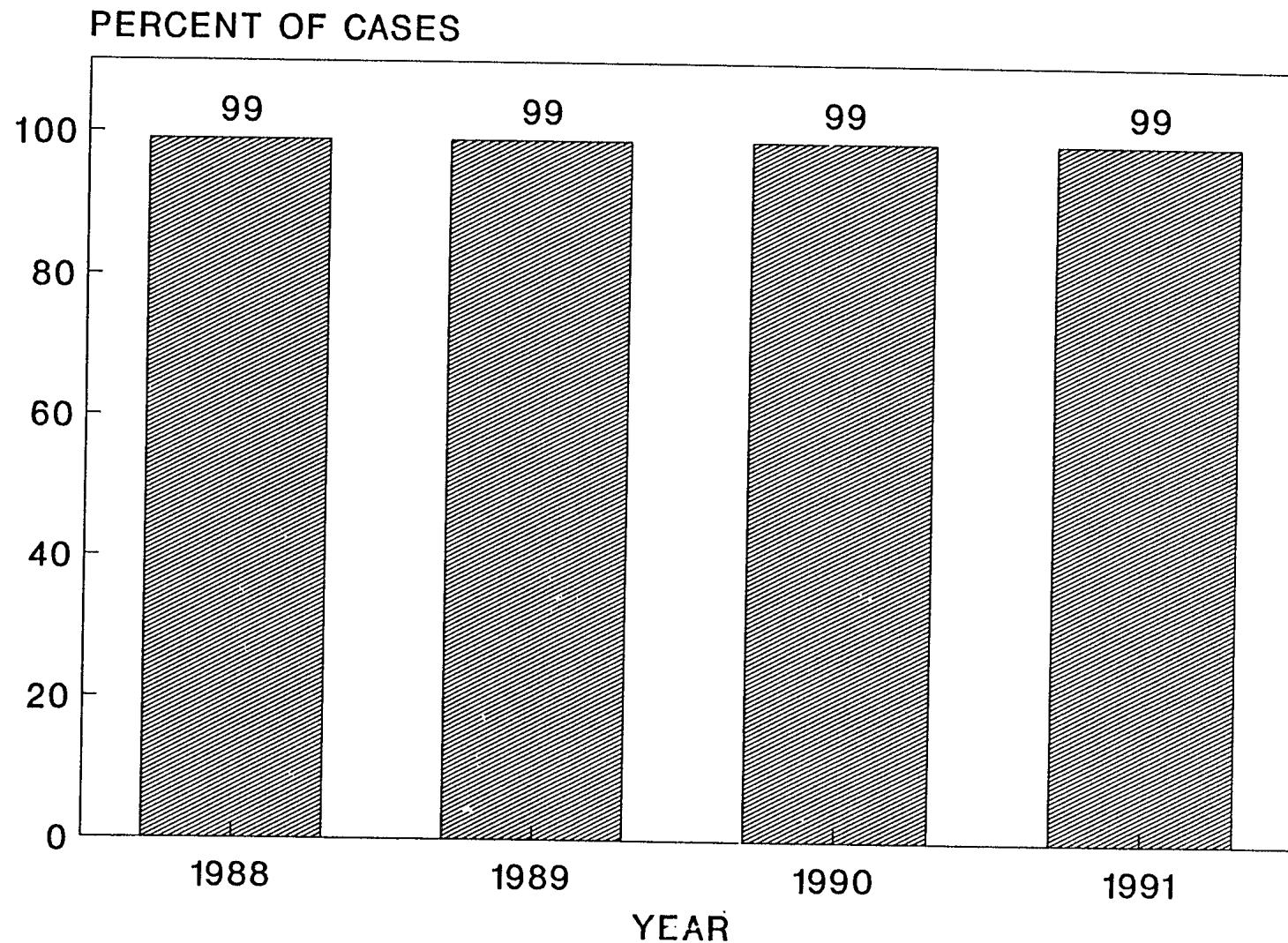
N.B. - SAMPLE DATA IS FICTITIOUS

SLIDE 34

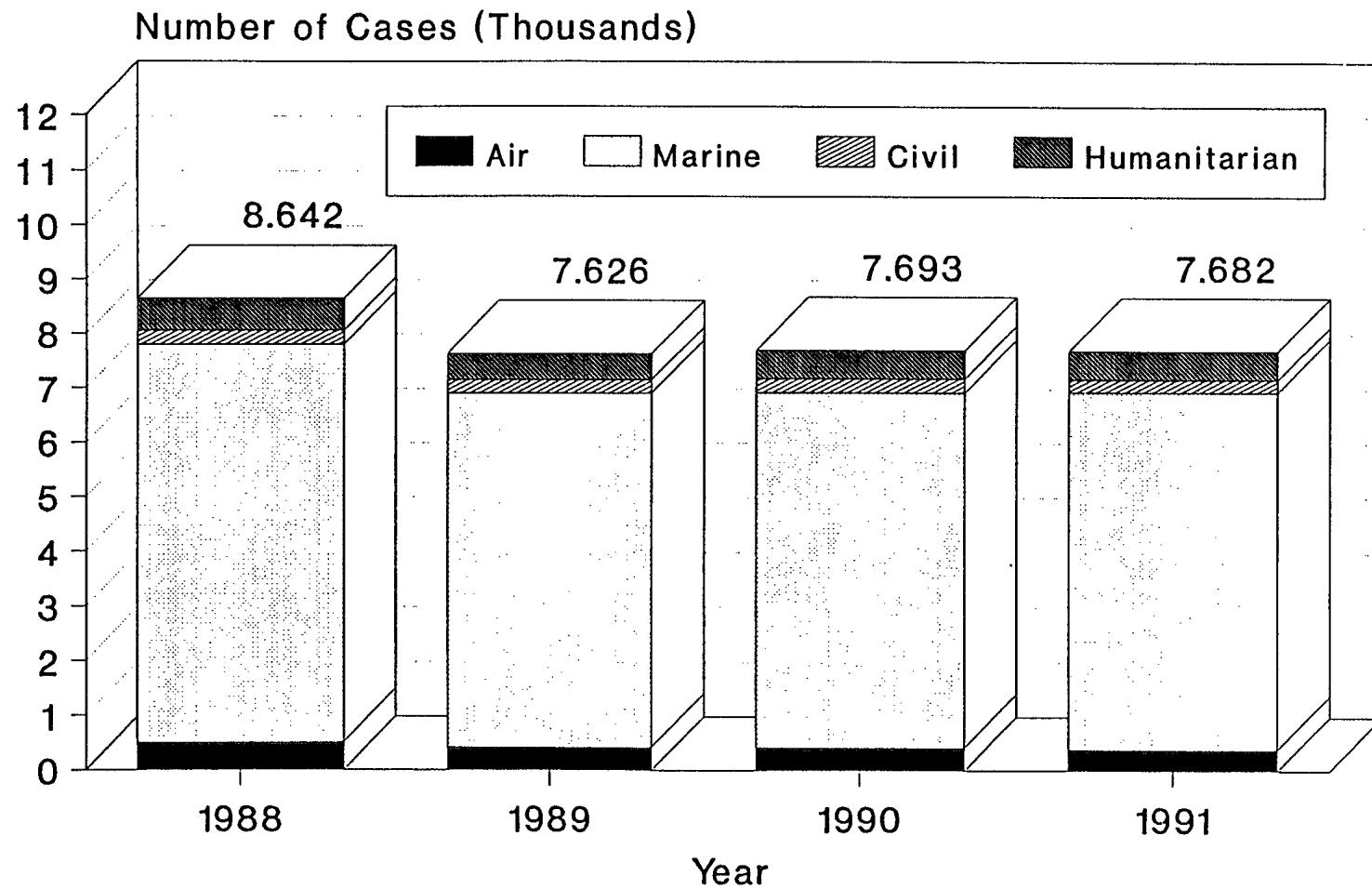
SAR CASES VS POB 1988-1991



RESPONSE PERFORMANCE - TRANSPORT CASES MANAGEABLE BY 1 SORTIE (CH113)



SAR INCIDENT VOLUME 1988-1991 (TOTAL FOR RCC)



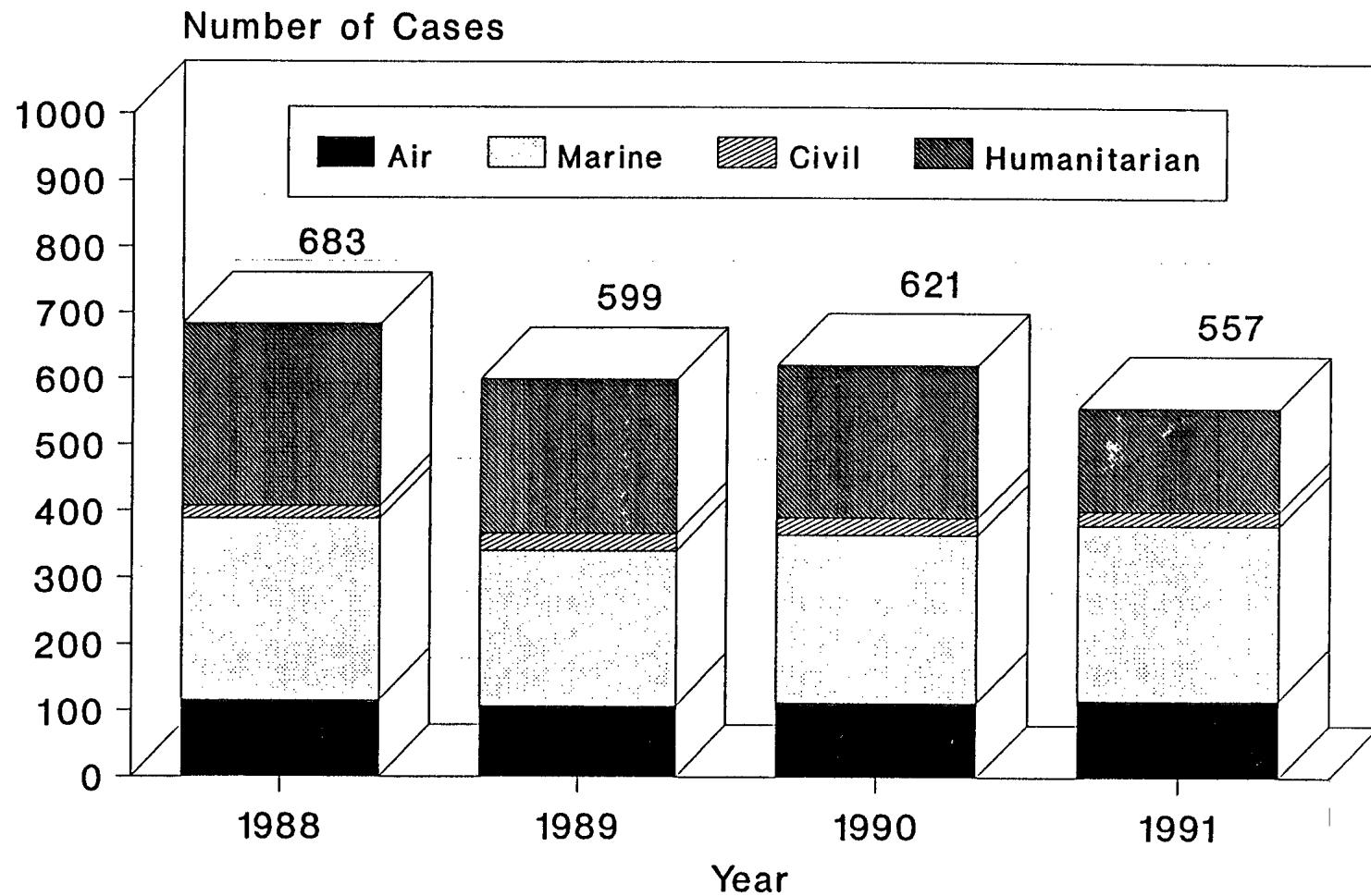
- 50 -

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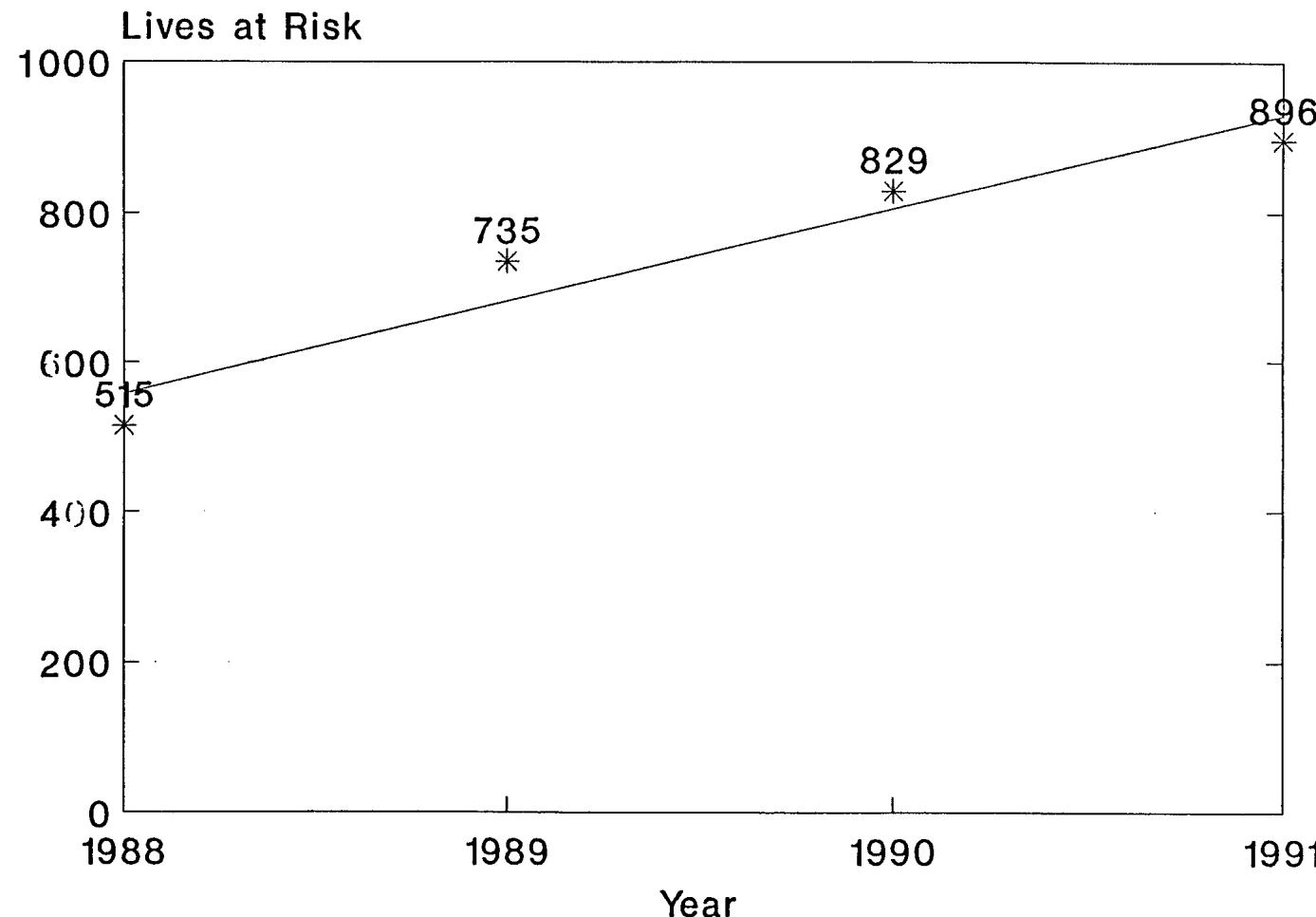
SAR INCIDENT VOLUME

1988-1991

(INVOLVING DND PRIMARY RESOURCES)

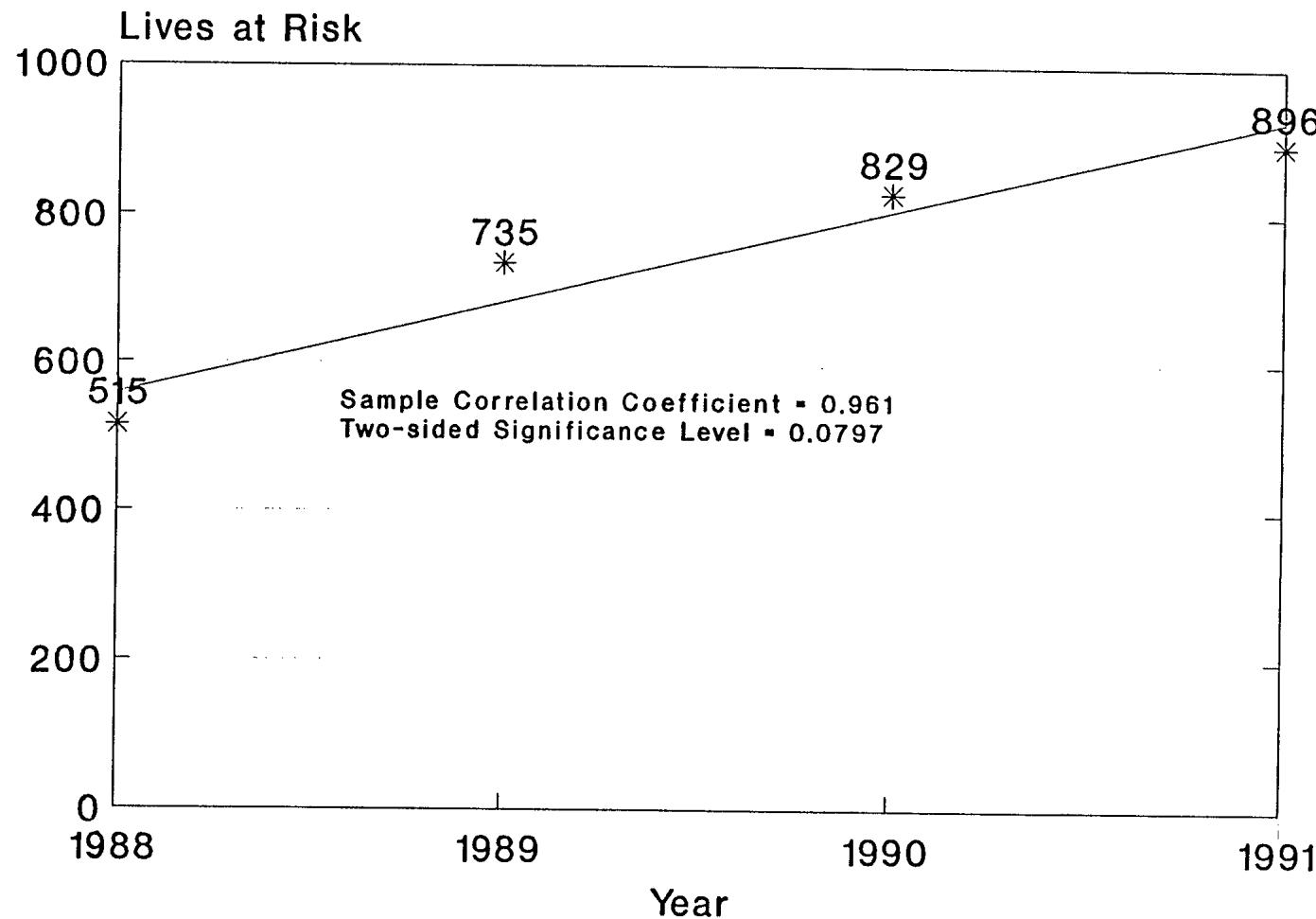


LIVES AT RISK 1988-1991 (CASES INVOLVING DND PRIMARY RESOURCES)



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STATISTICAL ANALYSIS LIVES AT RISK 1988-1991



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SLIDE 40

SAR PERFORMANCE INDICATORS CONCLUSIONS

1. Proposed indicators provide the basis for a broad evaluation of DND SAR performance.
2. Suggested indicators can be readily understood and appreciated by non-SAR specialists (i.e. general public) as well as SAR evaluators and planners.
3. Proposed performance indicators provide an efficient mechanism to identify trends that may be occurring.
4. Proposed indicators will provide sound support for DND SAR planning and decision-making.

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This report records the content of a presentation on options for Search and Rescue performance indicators that could be utilized by the Department of National Defence. The work was conducted as component of a research project to evaluate the SAR data collection system and its capability to support SAR performance assessment. Delays in the project have created the potential for the loss of this information. This report was prepared to preserve this material in an easily accessible form.

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